THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY
October 3, 1988 · Vol. XXII · No. 40 · 152 Pages · $2/Copy · $44/Year

COMPUTERWORLD

INSIDE

Hardware Round-up — Perspectives on trends and products in the PC, workstation and small system markets. Page 65.

In Depth — Getting key financial data to the CEO. Page 93.

Dbase wait goes on as Ashton-Tate slips latest shipment target. Page 6.

Perot-EDS battle heats up as GM division sues founder over competitive start-up. Page 4.

CIO shuffle continues, with Hammitt jumping from Pillsbury to United Technologies. Page 10.

Users cold to promise of multivendor network management strategies. Page 133.

OSF basks in technology but is not yet in AT&T's embrace. Page 8.

VMS 5 users, check out that file! DEC leaves future product trail in operating system data. Page 10.

Data General pink slips handed out to 800 workers on eve of large system announcement. Page 6.

Unhappy Mac buyers consider options in wake of latest price hikes. Page 45.

Shoot-out at SQL corral

Gates, Esber clash over Novell technology access

BY PATRICIA KEEFE
and DOUGLAS BARNEY
CW STAFF

DALLAS — With his slight build and his glasses, Microsoft Chairman Bill Gates could hardly pass for a seasoned gunfighter, but last Monday he won a shoot-out with Ashton-Tate Chairman Ed Esber and, in the process, blew away Novell's shot at the database market.

Before the smoke cleared, Gates had strong-armed Ashton-Tate into canceling a 2½-hour-long press conference and shucking a strategic alliance with Novell, Inc. The deal would have netted Novell marketing rights and technical access to SQL Server, a product being jointly developed by Ashton-Tate Corp., Microsoft Corp. and Sybase, Inc. Novell and Microsoft are archrivals in local-area network operating systems.

The agreement, positioned as a centerpiece of the Novell-sponsored Networld 88 show, disintegrated after virulent and loud objections voiced by Gates in the hallway of an industry conference held last week in California, according to analysts and knowledgeable sources close to all three companies. SQL Server is a networked personal computer database scheduled to ship later this year that runs under Microsoft's OS/2.

Agreement squelched

If the agreement had not been squelched, Novell could have bundled the unshipped SQL Server with its popular Netware local-area network operating system software and sold it through thousands of Novell resellers, a source close to the company said. Under terms of

Continued on page 6

Users push wish list on ISDN firms

BY JEAN S. BOZMAN
CW STAFF

ST. LOUIS — Large corporate users sat down and reasoned with vendors at a meeting of the North American ISDN Users' Forum here last week. When the three-day meeting ended, vendors had a list of nearly 30 priority applications that users would like to see up and running in the early stages of Integrated Services Digital Network implementation.

"The user is, in effect, doing some of the market research for the ISDN vendors," said Michael A. Kanthal, a Citibank NA vice-president who chaired the financial users group here. "We're coming up with business needs and goals for ISDN, and the vendors will try to meet those with products." About 90 users met in industry-specific workshops to refine proposed applications while 100 vendor representatives looked on.

"Hopefully we're moving toward standards that will allow

Continued on page 133

EPA targets halon: Data site dilemma

BY MITCH BETTS
CW STAFF

WASHINGTON, D.C. — The U.S. Environmental Protection Agency called last week for a complete phaseout of halon — the chemical used in fire-suppression equipment at many data centers — because it contributes to the depletion of the Earth's protective ozone layer.

The EPA earlier had sought a 50% reduction in chlorofluorocarbons and halons; however, EPA Administrator Lee M. Thomas said new scientific evidence shows that the ozone-depletion problem is worse than previously thought.

The EPA urged that an international ozone treaty called the Montreal Protocol be revised to require a 100% phaseout of CFCs and halons, rather than a 50% reduction. Thomas did not announce specific regulatory actions or a timetable for the phaseout in the U.S., which would be implemented after revision of the protocol, but there is speculation the phaseout would take about 10 years.

Some MIS managers have already switched from halon-based systems to water sprinklers in response to the earlier

Continued on page 4

Atmospheric alert

The EPA says Halon 1301, widely used in data centers, may be a danger to the ozone layer

Chemical	1985 U.S. consumption	Production growth rate*	Lifetime in atmosphere
Halon 1301	43.4 million kg	2.7%	110 years
Halon 1211		4.3%	25 years
CFC-113	54.8 million kg	2.9%	90 years

* Average annual growth rate in U.S. production, without regulation, from 1985 to 2050

SOURCE: U.S. ENVIRONMENTAL PROTECTION AGENCY
CW CHART

THE ULTIMATE ENTREPRENEUR

How DEC passed up the PC boom

The following is an excerpt from the new book *The Ultimate Entrepreneur*, written by *Computerworld* editors Glenn Rifkin and George Harrar and published by Contemporary Books.

As Dan Bricklin sat in his finance class at the Harvard Business School, the idea started coming to him. He'd been making errors consistently on his assignment: three-year cash and balance sheet projections. He was relying on his Texas Instruments calculator to handle the complex manipulation of numbers.

But this little machine wasn't doing the job. As Bricklin stared at the blackboard over the next few days, an idea formed in his mind for computing these calculations more quickly. He imagined an electronic spreadsheet.

Bricklin needed a machine to bring his idea to life. It was the spring of 1978, and personal computers were just hitting the market. Before going to Harvard, Bricklin had spent three years at Digital Equipment Corp. as a programmer. He had worked on all of the company's major lines — the PDP-8, Decsystem-10 and PDP-11. He'd seen the beginnings of the VAX. He had a passion for DEC machines.

O'CONNELL/LADOUCEUR
Ken Olsen

A few months before, Bricklin had attended DEC's stockholders' meeting and seen a demonstration of the PDT, or Programmable Data Terminal, which came from Vice-President Andy Knowles' terminals group. Knowles had long held the vision of DEC building a PC, but it was clear that Ken Olsen, DEC's president, didn't believe in such a machine. He had gone so far as to prohibit the use of the term "personal computer" within the firm.

Continued on page 97

NEWSPAPER

SECOND CLASS MAIL

IN THIS ISSUE

Whip those MIPS. Data General's latest high-end MV system is expected to trounce the performance of DEC's 8800 series machines. Page 6.

Storage salvos. IBM announces price cuts on 3480 tape storage models and moves up 3990 Model 3 delivery date — minus Extended Features. Page 16.

NEWS

4 EDS sues Perot for breach of contract.

4 Prime expected to bid for GE's Calma.

5 Interop network conference reveals OSI tendencies.

5 Tandy expects depressed quarterly revenue from slow shipments.

6 Data General closes plants to stay afloat in mini washout.

8 ETA Systems, facing losses, moves CEO.

8 Forty vendor technologies try out for OSF team at first general meeting.

10 Pillsbury is latest company to do the CIO shuffle.

10 Analysts detect DEC product hints hidden in VMS.

14 Vendors and retailers battle over bill to ban software rentals.

15 Xerox joins the desktop presentation market.

15 Software AG unleashes products, announces Wang platform compatibility.

16 Oracle enters financial applications arena with four accounting packages.

18 Optical-disk document transfer saves insurer as much as $75K.

18 TI's mid-range attack packs lifetime warranty wallop.

19 Experts expect popularity of Compaq 386SX model to lead others into arena.

19 Tandem to offer Macs connected to its Nonstop OLTP machines.

133 Users perceive latest network management strategies as single-vendor traps.

133 Corporations want FCC to ensure network privacy.

SYSTEMS & SOFTWARE

25 Successor to disappointing IBM VM/XA SP 1 on track and aiming to please.

25 Report says service and maintenance providers must diversify to stay alive.

25 ADR's Librarian now runs in DOS/VSE environment.

Big waves in small hardware. Page 65.

MICROCOMPUTING

45 Users aren't buying Apple's excuses for Mac price hikes.

45 Ashton-Tate quick-search utility finds files in library.

45 Samna's latest word processor sports graphical elements.

NETWORKING

59 Large firms to spend more on net management, less on data transmission.

59 IBM unveils net management system for resold NET T1 switches.

59 IBM is late with its 16M-bit Token-Ring.

MANAGEMENT

101 PCs help open MIS doors to the handicapped.

101 Days of future past: Aetna's MIS chief takes his cues from history.

Quotable

"Why would anyone need a computer of their own?"

KEN OLSEN
DEC CHAIRMAN, 1974

See story page 1.

COMPUTER INDUSTRY

109 Top IBM exec jumps ship for oil industry.

109 MSI Data dodges Telxon acquisition by merging with other firm.

109 More casualties confirmed at Memotec's Infinet subsidiary.

COMPUTER CAREERS

114 Programmers wanting to work with AS/400 should tweak RPG III expertise.

TRENDS

134 An MIS budget survey shows links to type of computer installed.

HARDWARE ROUNDUP

65 An analysis of the currents that will set future directions in PCs, workstations and small systems.

IN DEPTH

93 Lotus' finance group makes critical information more accessible to top execs. By Harry Andersen.

OPINION & ANALYSIS

23 Wohl weighs the pros and cons of multivendor trend.

25 Bozman finds life in the old "sneakernet" system.

45 Barney takes offense at being labeled a slime-wart.

59 Barrett pitches IBM tools for replacing dumb terminals with intelligent workstations.

101 Brittain wants programmers to get their acts in order.

109 Szuprowicz believes 386 machines will ignite explosion of expert systems deployment in 1990s.

DEPARTMENTS

8 News Shorts

22 Editorial

124 Marketplace

132 Stocks

134 Inside Lines

Olympic detectives

HP's chemical-testers sniffed out steroid use

BY J. A. SAVAGE
CW STAFF

Canada's Olympic ex-medalist, Ben Johnson, lost his gold to a reputed steroid habit. But no one would have been the wiser without one of the 12 Hewlett-Packard Co. computer-based chemical-measuring devices sent to the Olympics to keep the competitors honest.

The Doping Control Center of the Korea Advanced Institute of Science and Technology bought six HP Gas Chromatograph/Mass Spectrometers, and HP donated another six of the $60,000 machines for the duration of the Olympics.

A test takes about half an hour, during which chemical elements are physically separated out of an athlete's urine. The mass spectrometer part of the machine measures chemical molecules and graphically produces patterns characteristic of the molecular structure, much like a fingerprint.

The chromatograph displays on a monitor a time line of peaks and valleys representative of those molecules during the time they are spun out of the spectrometer.

Joe Friday would be proud

"A user will move the cursor to a peak and ask the computer for the molecular spectrum that peak represents," said Larry Cattran, HP's product line manager for the system. "Then he will ask for a search. The computer will search up to 70,000 fingerprints in 30 seconds."

Cattran said, for instance, that if you are looking for cocaine, you match the library fingerprint for the chemical with what the mass spectrometer has found in the athlete's urine.

The systems are based on HP 9000 workstations. Cattran said the Doping Center needed 24-hour turnaround on the tests; thus, HP loaned it half of the machines just for peak use during the Olympics.

IBM denies plans for 386-based AT bus PC

BY WILLIAM BRANDEL
CW STAFF

IBM last week denied a report by *The Wall Street Journal* that it is discussing the possibility of introducing an Intel Corp. 80386 personal computer based on the IBM Personal Computer AT bus but said it may introduce more AT bus machines in the future.

Responding to the Journal report that IBM is developing a PC using the Intel 80386SX chip without the Micro Channel, an IBM spokeswoman said, "We have no plans to introduce a machine based on the 80386 chip without using the Micro Channel. The story is wrong."

She said IBM will continue to enhance its low-end product line "at every price point. The Model 30s and 50s are examples of this."

When introducing the Personal System/2s in April, IBM said it was discontinuing, but did not rule out reintroducing, the AT bus. IBM is currently being perceived as loosening its embrace on the Micro Channel after resurrecting the AT bus in the Model 30 announcement in August.

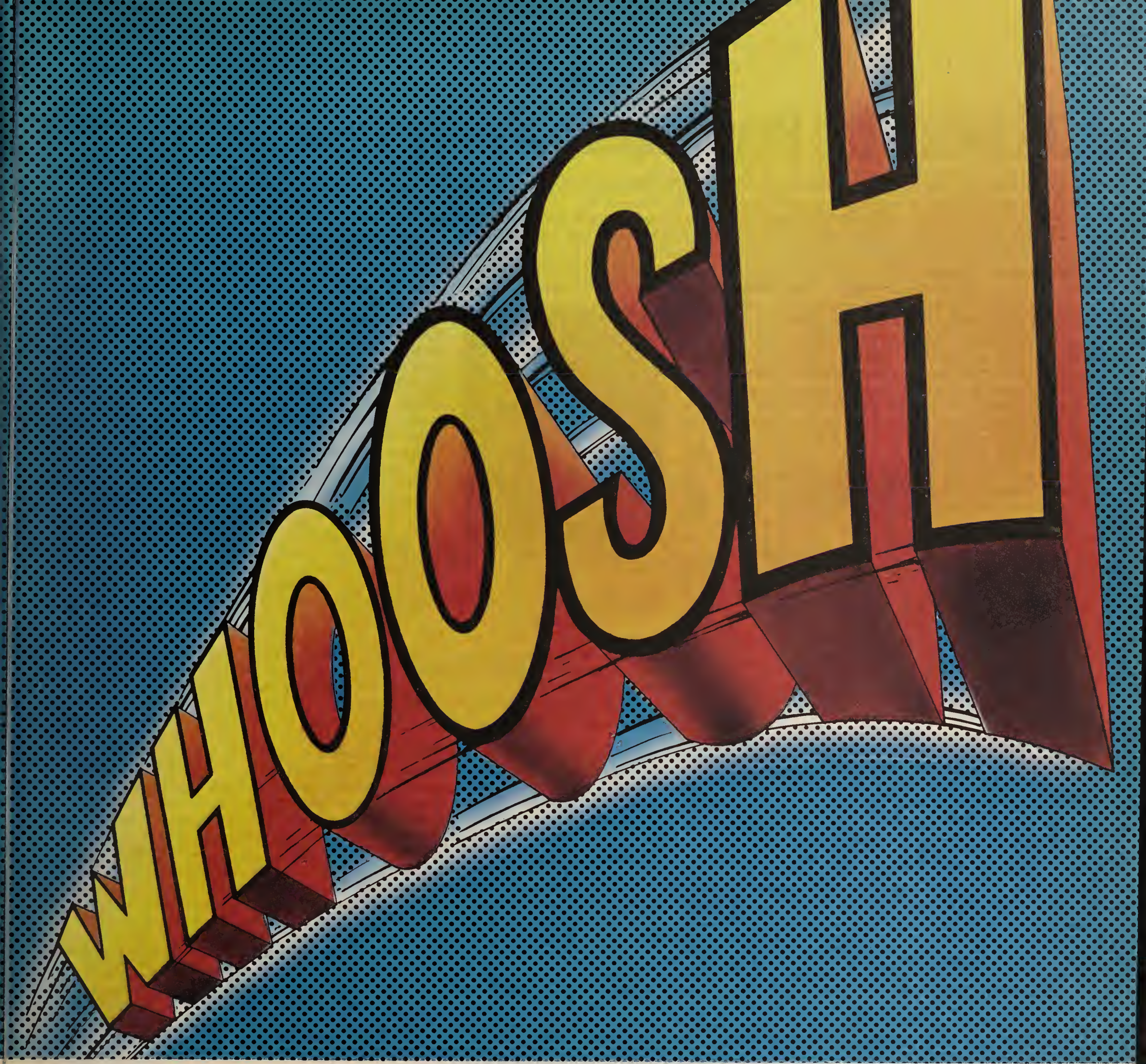
Adding to a deteriorating relationship with the MIS community, IBM has internal confusion to sort, said John Dunkle, vice-president of the Aberdeen Group, a Boston-based market research firm.

Dunkle said IBM will stick to its corporate rhetorical support of the Micro Channel. But he added it may be forced to bring another AT bus product to its customers, "which will just compound the market chaos and leave MIS in the crunch."

The IBM spokeswoman admitted that IBM was forced to make a painful decision regarding the AT bus. "It was tough to leave behind the AT. But if we had to do it over again, we'd do the same thing," she said.

> "IT WAS tough to leave behind the AT. But if we had to do it over again, we'd do the same thing."
>
> IBM SPOKESWOMAN

Compaq Corp. Vice-President of Sales and Marketing Mike Swavely said that it would make sense for IBM to continue introducing products based around the 16-bit industry standard architecture bus. "The introduction of the Model 30 is more evidence that [this architecture] is the largest market opportunity out there," he said.



THIS GIVES YOU A ROUGH IDEA OF HOW FAST OUR SOFTWARE IS.

It's only a rough idea, granted.

But then, how do we convey the speed of our products? Software that can dramatically reduce the use of your computer resources: CPU Time, SIOs and the like. Typically, by as much as 50%. Frequently, even more.

And that not only goes for our sorts, but for all our products.

But there's really only one way to get more than a rough idea of how fast our software is: try it yourself. To arrange for a test on your system, call **201-930-8200.**

We'll whoosh right over.

syncsort INC.

© 1988 Syncsort Incorporated, 50 Tice Boulevard, Woodcliff Lake, NJ 07675.

EDS escalates Perot squabble

GM-owned firm sues former founder over noncompete agreement

BY NELL MARGOLIS
CW STAFF

HERNDON, Va. — Fighting the hand that once fed it, Electronic Data Systems Corp. (EDS) last week sued founder H. Ross Perot for breach of the noncompetition contract he signed in December 1987 as part of General Motors Corp.'s $700 million purchase of EDS.

The flamboyant Texas entrepreneur's latest venture — Vienna, Va.-based systems integration company Perot Systems, Inc. — was named codefendant in the suit, which initially asks for an injunction halting further Perot activity. A hearing has been assigned for Oct. 13.

No particular event triggered the legal action, an EDS spokesman said. "It just became clear from a number of public statements and marketing events that [Perot] had no intention of honoring his contract not to compete with EDS."

However, in a prepared statement, Perot said, "I am meticulously following the letter and spirit of the buyout agreement."

"There is absolutely no doubt whatsoever that Perot Systems is competing, and competing aggressively, with EDS," said Stephen McClellan, an analyst at Merrill Lynch & Co. However, the question is not whether Perot is competing with EDS but whether he is doing it lawfully, within the meaning of the 1987 contract, McClellan added.

"He's a pretty astute person," McClellan said, "and he and his lawyers all know [the noncompetition agreement] backwards and forwards."

As soon as possible

Perot Systems opened its doors this past June — the earliest allowable date under terms of the contested agreement, according to McClellan — with about 50 ex-EDS employees on the staff, including eight executives. The newcomer immediately picked a plum: a 10-year sole-source contract to provide systems integration services to the U.S. Postal Service.

The contract award was protested by EDS and a third systems integration contender, Planning Research Corp.

H. Ross Perot

The General Services Administration's Board of Contract Appeals ruled it illegal, and the contract was subsequently modified, but Perot was kept on in what appeared to be a general contractor's role.

Late last week, a federal appeals court decided that the GSA is without jurisdiction over Postal Service contracts, giving Perot and the post office a green light. The EDS lawsuit, however, now poses a potential barrier to Perot's keeping the lucrative contract.

Notwithstanding EDS' protests, McClellan targets the sweetheart deal with the Postal Service as the starting point for the current — and escalating — hostilities between General Motors/EDS and Perot. The EDS suit, he said, "is their counterpunch for the Postal Service's contract."

Whatever began the fight, Perot last week left no doubt about his thoughts as to who would finish it. "GM will not succeed," Perot said. "It has made a serious strategic mistake, opening a Pandora's box of potential legal counterattacks."

Karen Kugel, an analyst at Framingham, Mass.-based market research firm International Data Corp., said that users should not be blinded by the fireworks. "It's not as though we have only two gladiators in the ring," Kugel said.

Halon

FROM PAGE 1

EPA warnings, according to Glenn T. Young, a disaster-recovery consultant at Coopers & Lybrand in Houston.

Young said it is too early to tell whether there will be halon shortages or steep price hikes for halon-based systems [CW, July 11].

Several MIS managers contacted last week had not heard of the EPA's concerns but said they are reluctant to switch to sprinklers. "Sometimes water causes more damage to computers than anything else," said Jack Caulfield, MIS director at Pall Corp. in East Hills, N.Y.

Jerry T. Nidiffer, director of information services at Welch Foods, Inc. in Westfield, N.Y., called sprinklers a disaster for a data center. Saying that halon-based systems are "one of the few systems that insurance companies recommend," he said MIS managers will need other alternatives if halon is banned.

Meanwhile, the halon products industry is counting on Du Pont Co. and other halon producers to come up with an ozone-friendly alternative to Halon 1301, used in fire-suppression equipment for computer rooms.

The industry is also conducting research on new ways to test halon systems so that halon is not actually discharged during system testing, according to William Henderson, halon product manager at the Pyrotronics division of Cerberus Technologies, Inc. in Cedar Knolls, N.J.

Halon 1301 is used in data centers and document rooms because it leaves no residue and is nontoxic to humans so that the room does not have to be evacuated. Another halon compound, Halon 1211, is found in portable fire extinguishers that are sometimes used in computer rooms.

Still in the game

Henderson cautioned that it is not time to push the panic button for the halon industry because halon is a long way from being banned, and extensive research is underway to find a chemical substitute.

"We recognize that something must be done . . . but we don't want to be picked on," Henderson said. "Halon is a very minute part of the [ozone] problem."

EPA officials agreed that CFC emissions are by far the biggest culprit, but they added that "halons are, kilogram for kilogram, more potent ozone-depleters than CFCs" and therefore should be regulated.

Ozone in the upper atmosphere shields the earth's surface from harmful ultraviolet radiation that can cause skin cancer and eye cataracts in people and damage forests, crops and wildlife.

The EPA's Thomas said that new studies "paint an alarming picture of present and future global ozone levels."

The EPA noted that the halon industry has taken several steps to reduce unnecessary emissions. For example, the industry decided to not require mandatory discharge testing of new systems under its fire-protection code. Further, it is exploring the development of alternative test gases, it is seeking ways to limit discharges from false alarms and it is considering methods of tracking and regulating halon emissions.

Prime eyes another spending spree

BY NELL MARGOLIS
CW STAFF

NATICK, Mass. — Prime Computer, Inc. has its wallet out again, according to industry sources. This time it is said to be ready to pick up General Electric Co.'s Calma subsidiary, a computer-aided design and manufacturing (CAD/CAM) company with declining sales and a desirable customer base that could shore up Prime's market position against a suddenly strong challenge from Intergraph Corp.

"Our company policy is not to comment on possible mergers or acquisitions," Prime spokesman Joe Gavaghan said. He confirmed, however, that Prime's intent to grow through acquisitions has been frequently alluded to by company executives, including Chief Executive Officer Joe M. Henson.

Prime stunned investors in December with its $435 million hostile takeover of Computervision Corp., which catapulted the combined company into second place behind IBM in the $5.2 billion CAD/CAM market.

A Calma buy could ensure Prime's hold on the No. 2 market slot, said Bruce Jenkins, vice-president of Daratech, a Cambridge, Mass.-based market research firm. Current Daratech projections for 1988 show Prime knocked down to third place in CAD/CAM by Huntsville, Ala.-based Intergraph, whose workstation sales are thriving as more Intergraph-compatible software emerges, Jenkins said.

He said reliable sources have told him one of the inducements being offered Prime is a lucrative GE contract for "substantial amounts" of Prime products.

CORRECTIONS

Not all upgrades to National Advanced Systems' AS/EX series [CW Sept. 19] require box swaps. That type of "transition upgrade" is needed when moving from the Models 40 and below to a Model 50 and above. The upgrade from an AS/XL model to an AS/EX model is a field upgrade involving replacement of circuit boards and microcode.

Amdahl Corp. processors were omitted from the Large Systems Roundup [CW, Sept. 19]. For information, Amdahl can be contacted at 408-746-6000.

COMPUTERWORLD

Editor in Chief
Bill Laberis
Executive Editor
Paul Gillin

News Editor
Peter Bartolik

Technical Editor
Charles Babcock

Senior Editors
James Connolly, Management
Clinton Wilder, Industry
Elisabeth Horwitt, Networking
Patricia Keefe, Networking
Douglas Barney, Microcomputing
Stanley Gibson, Software
Michael Alexander, Microcomputing
Rosemary Hamilton, Systems

Senior Writers
Nell Margolis
Alan J. Ryan
Amy Cortese
William Brandel

Staff Writer
James Daly

New Products Writer
Sally Cusack

Features Editor
George Harrar

Senior Editors
Glenn Rifkin
Joanne Kelleher, Spotlight and Executive Report
Michael L. Sullivan-Trainor, Special Projects

Senior Writer
David A. Ludlum

Associate Editors
Deborah Fickling
Kelly Shea

Assistant Editor
Sharon Baker

Researcher
Bonnie MacKeil
Assistant Researcher
Kevin Burden

Chief Copy Editor
Steven M. Ulfelder

Assistant Chief Copy Editor
Mary Grover

Copy Editors
Cathleen A. Duffy
Richard R. Pastore
Donald St. John
Joyce Chutchian

Art Director
Nancy Kowal

Graphics Specialists
Frank C. O'Connell
Amy J. Swanson

Graphics Researcher
Laura O'Connell

Graphic Designer
P. Charles Ladouceur

Editorial Assistants
Patricia Faherty
Linda Gorgone
Lorraine Witzell

Rights and Permissions Manager
Nancy Shannon

News Bureaus
Mid-Atlantic
201/967-1350

Washington, D.C.
202/347-6718

Mitch Betts, Bureau Chief

West Coast
415/347-0555

Kathy Chin Leong, Bureau Chief
Julie Pitta, Senior Correspondent
Stephen Jones, Correspondent
J.A. Savage, Correspondent
Mary Elliston, Editorial Assistant

Midwest
312/827-4433

Jean S. Bozman, Bureau Chief

IDG News Service
Kathleen A. Gow, Director

Main Editorial Office
Box 9171, 375 Cochituate Road
Framingham, MA 01701-9171
508/879-0700

OSI muscles way onto net show stage

Apple, UB, HP among vendors pledging support

BY KATHY CHIN LEONG
CW STAFF

SANTA CLARA, Calif. — TCP/IP is real, but OSI is inevitable. That was the message hammered home to users in a barrage of double-edged vendor announcements at the Interop 88 network conference here last week.

Unlike years past, when Transmission Control Protocol/Internet Protocol vendors deliberately ignored Open Systems Interconnect because it was a rough, unfinished network protocol, major suppliers chimed in this time, underscoring their dual commitment to TCP/IP and OSI.

For instance, Apple Computer, Inc. introduced MacTCP for the Macintosh operating system. Instead of unveiling it as a networking application, Apple made the product a developer's tool kit, which will be licensed for $2,500. Apple also has an interest in OSI, since it has a 10% interest in Touch Communications, Inc., an OSI developer.

Ungermann-Bass, Inc. in Santa Clara, Calif., introduced Net/One TCP-Mac, a networking application that includes file transfer and electronic mail functions as well as a virtual terminal developed using MacTCP.

Netman fever

On the flipside of the network coin, UB boasted of its participation in the Netman demo, a 13-vendor demonstration of OSI networking protocols running on top of a TCP/IP network [CW, Sept. 19].

Hewlett-Packard Co. took the opportunity to announce that its HP Openview network management method will manage current TCP/IP networks as well as future OSI networks.

The vendor echo of dual support for TCP/IP and OSI rings well in the ears of users who are interested in migrating. During the three-day conference, sponsored by Advanced Computing Environments, the U.S. Navy held a workshop to discuss how users can migrate from TCP/IP to OSI.

Jeff Case, network manager and professor at the University of Tennessee, said the campus is an avid user of TCP/IP networks because it is the only solid protocol that works with a variety of vendors' products. However, "we are anxious to move to OSI and expect to do so in three to five years," he said.

Analysts tracking the user community said TCP/IP will be around for quite some time. No one knows for sure when OSI will be a finished protocol, so analysts such as Joe Seidler at Infonetics, Inc. are confident to proclaim that TCP/IP has not reached its peak in popularity.

"It's got a long life ahead," Seidler said. "For the largest users who must plan for the future, vendors have to offer some kind of OSI plan. For today, TCP/IP is here and it works."

What will foster TCP/IP's popularity, Seidler said, is the network management protocol called Simple Network Management Protocol (SNMP), an approved standard that was designed for monitoring TCP/IP networks. The protocol can access the same network management database as a similar protocol proposed for OSI.

During the show, several vendors announced support for SNMP and staged an interoperability demonstration on the exhibit floor.

At the same time, 13 vendors staged the Netman interoperability demo to show how the OSI implementation of network management runs over TCP/IP networks. Known as Common Management Information Protocol, the draft-standard protocol was used by vendors such as HP, UB and Digital Equipment Corp.

Late shipments hit Tandy sales

FORT WORTH, Texas — Tandy Corp. last week said a shortage of usable components that slowed shipments of its personal computers is expected to depress revenue this quarter.

According to Ed Juge, Tandy director of product development, the impact on revenue in the first fiscal quarter ended Sept. 30 will be slight. Tandy expects to make up for any dip in sales in the following quarter, Juge added. "The bad news is that we haven't been shipping on time," he said. "The good news is that we'll sell everything we make."

Shipments of unusable components have delayed the delivery of Tandy's three newest products: the Tandy 5000MC, an Intel Corp. 80386-based system compatible with IBM's Micro Channel Architecture; the Tandy 1000TL, an Intel 80286-based system; and the Tandy 1000SL, an Intel 8086-based PC.

Introduced in April, the Tandy 5000MC began shipping in late August, nearly two months behind schedule.

IAM vs VSAM
The Incredible Shrinking Machine
IAM Reduces the Size of Your VSAM Files by 30 to 70%

IAM FILE STRUCTURE
IAM SAVES 20 to 40% DASD SPACE
IAM uses an advanced file structure which is far superior to VSAM. IAM's supercompressed index requires a fraction of the space taken by VSAM. IAM's freespace concepts make much more efficient use of disk space. IAM's blocksizes are not restricted as VSAM's are, making full utilization of each track. IAM is not affected by large key sizes which can result in VSAM wasting CI's in every Control Area.

DATA COMPRESSION
SAVES AN ADDITIONAL 20 to 50% DASD SPACE
IAM optionally compresses data records. Most files contain records with unused fields or repeating sets of characters. When IAM applies its proprietary compression techniques, the result is an additional 20 to 50% reduction in file size.
IAM's CPU time is dramatically less than competing compression products. In fact, since IAM's CPU time is normally much less than VSAM, IAM with data compression takes less CPU time than normal VSAM processing.

RELEASE
AUTOMATIC RELEASE OF UNUSED SPACE
IAM takes the guessing game out of VSAM space allocation. Large amounts of disk space are wasted when users over-estimate how much space VSAM requires or how many records a file will contain. VSAM cannot release overallocated space.

TRANSPARENT
VSAM files account for the lion's share of disk space used in most installations. Online systems (CICS), BATCH jobs, TSO, SMP/E and other applications make extensive use of keyed index VSAM (KSDS) files.
IAM is a transparent alternative to VSAM KSDS files, which substantially reduces the impact of VSAM processing in your installation. There are no modifications to programs or JCL to use IAM files in place of VSAM.

SMF ANALYSIS
VSAM SIZE REPORT

DATA SET NAME	ALLOC TRKS	TOTAL EXCPS
BIG.CLUSTER	37155	2507803
BIG.CLUSTER.DATA	37100	2105001
BIG.CLUSTER.INDEX	55	402802
A.FILE.SMALLER	16540	679216
A.FILE.SMALLER.DATA	16500	270501
A.FILE.SMALLER.INDEX	40	408715
SMPE.TDFP223.CSI	12315	3880211
SMPE.TDFP223.DATA	12300	3075021
SMPE.TDFP223.INDEX	15	805190

IAM's SMF analysis program identifies your largest and most highly used VSAM files. **To see your VSAM usage, send for the FREE SMF reporting program (IAMSMFVS).**

Call for a Free No Obligation 90 Day Trial

From the Makers of FDR & ABR
Supports MVS and MVS/XA

INNOVATION DATA PROCESSING
Innovation Plaza, 275 Paterson Avenue
Little Falls, NJ 07424 (201) 890-7300

DG cuts work force by 800

BY NELL MARGOLIS
CW STAFF

WESTBORO, Mass. — Data General Corp. last week struck another blow in its ongoing battle against the odds in the maturing minicomputer market with the closing of two high-end manufacturing plants — a move calculated to cut about 800 jobs and some $50 million in costs.

To effect the consolidations, which are expected to be completed by spring, the company took an approximate $45 million charge against operations in its fourth quarter ended Sept. 24, according to a DG spokesman.

Market analysts generally applauded the move, which they saw as stemming from problems dogging the minicomputer sector in general rather than DG in particular.

Citing the company's avowed mission to gain and retain fighting trim, recently appointed Executive Vice-President and Chief Operating Officer Ronald Skates said, "We see ongoing and tough cost management as a way of life for Data General."

A way of life, indeed: Major-league layoffs, in aid of operating efficiency, have become an annual event in Westboro (see chart).

The flow is not entirely one-way, the spokesman said. DG is "changing our employee mix from a manufacturing bias to one that reflects more of a marketing direction" and is continuing to staff up in sales, systems engineering and research and development, he added.

Stephen Dube, an analyst at Shearson Lehman Hutton, Inc., said the latest round of cost-cutting measures will "hopefully put Data General back at par; they need to be there to pursue their new strategies."

DG management recently announced a two-pronged strategy: continued development and support of the company's proprietary minicomputer line coupled with a simultaneous advance into the Unix-based market with a high-power, relatively low-cost workstation line based on Motorola, Inc.'s superspeed 88000 reduced instruction set computing chip.

On target

The Motorola project, expected to yield its first fruit sometime next spring, is on schedule, the spokesman said.

DG's repositioning initiative has been well received by industry analysts. Minicomputers are moving in two directions: down to file-server status and up to "a new mini-mainframe class," said Joseph Payne, an analyst at Alex Brown & Sons, Inc., in a research report issued last week. "We believe that Data General will participate actively in both movements."

Whether last week's moves will improve the company's positioning with respect to the Motorola-based line "depends on when the new products actually hit the market and what the world looks like then," said Suzanne Peterson Case, an analyst at First Boston Corp. In the short term, however, she referred to the move as both necessary and smart.

"Everyone keeps calling Data General a company in trouble," noted Peterson Case. "Nevertheless, they still manage to turn out almost $1.5 billion worth of products a year."

The pattern continues

Data General's current layoffs lengthen a string of similar moves in recent years

	Data General's layoffs of late
Summer 1985:	1,300 laid off to reduce company's break-even point
June 1986:	400 laid off, with closing of plants in Hong Kong and Austin, Texas
July 1986:	500 laid off across all areas except sales, marketing, engineering and R&D because of industry slump
July 1987:	950 laid off in midst of declining sales and large losses
September 1988:	800 lose jobs in latest force reduction

CW CHART

Oh — DG's adding a mini, too

Data General's timing could have been better.

The company is set to announce a high-end system today that is expected to take its MV line well beyond the millions of instructions per second (MIPS) range of Digital Equipment Corp.'s high-end 8800 series.

But what could have been a sunny day for the struggling minicomputer maker will likely have a dark cloud hanging over it. The announcement comes only days after the company announced the latest in a series of job cuts (see story above).

Today's scheduled announcement has long been expected by industry analysts. The system could take the MV product line, DG's bread and butter, into the 40-MIPS range, analysts said. The current high-end machine, the MV20000, is offered in uniprocessor and dual-processor configurations, so analysts expect the new offering to expand to a four-processor configuration.

Observers said DG will use today's event to stress its commitment to the MV proprietary line. Earlier this year, the company announced plans to use the Motorola, Inc. 88000 reduced instruction set computing (RISC) microprocessor for a new line of Unix-based low-end and mid-range systems.

"Monday will be the party for current customers to keep them satisfied while DG puts its RISC system together," said Michael Geran, vice-president of research at Nikko Securities International in New York.

Geran and other analysts said the new high-end product is a good move for DG because the firm needs to provide its installed base with more of a growth path as well as show the industry that it is still feisty enough to leapfrog DEC's systems.

ROSEMARY HAMILTON

Dbase IV delayed again

TORRANCE, Calif. — If you are planning to buy Ashton-Tate's Dbase IV, don't pull the money out of your wallet just yet. The long-anticipated product has once again been delayed.

Ashton-Tate said last week that Dbase IV, originally scheduled to ship by the end of July, will miss its latest deadline of last Friday. The new schedule has the product tentatively coming out of its final testing stage and into dealers' hands within the next three weeks.

Observers said the announcement should have little impact on Ashton-Tate's standing with users and the investment community as long as Dbase IV does in fact ship this month.

Dbase IV entered its last stage of testing, called the certification process, two weeks ago, as predicted by the company. At the time, Ashton-Tate Chairman Ed Esber declared, "Certification means that within one rebuild of the product, Dbase IV will be ready for production."

Not exactly. Lydia Dobyns, vice-president of marketing, said last week that Ashton-Tate developers have had to rebuild the 400,000-line application more times than initially expected. "It hasn't been as clean a process as we had expected," Dobyns said.

But Ashton-Tate chose its words carefully in a statement last week, hedging on a specific deadline. While saying it expects to release Dbase IV as early as the second week of this month, it added that it was "confident" the product will ship before "the end of our fiscal quarter, Oct. 31."

Ashton-Tate has drawn criticism during Dbase IV's development because it never established a formal beta-test program that sent out regular code upgrades to all test sites and solicited comments from test users. One early user characterized the testing process as "unstructured and inconsistent."

STEPHEN JONES

Shoot-out

FROM PAGE 1

the contract with Microsoft, Ashton-Tate can distribute SQL Server through resellers, which would apparently include Novell dealers.

Irking Microsoft in particular was Ashton-Tate's willingness to provide Novell with technology so that the latter company could support both Ashton-Tate's Dbase IV and the Sybase SQL database server. That would have spared Novell the trouble of reverse-engineering the Sybase server, the source close to Novell said.

On the warpath

While Microsoft knew that Ashton-Tate had planned to formalize its relationship with Novell, Gates did not find out until last week that the deal included an exchange of SQL Server technology. At that point, Gates' temper flared, knowledgeable sources confirmed.

Although Ashton-Tate had not promised Novell access to any Microsoft code, Esber backed down rather than "irreparably" damage the firm's relationship with Microsoft, a source familiar with the dispute said.

Novell and Ashton-Tate issued a press release saying the cancellation was an amicable one and that the duo will continue to work together. "Circumstances caused us not to go through with the announcement," said Craig Burton, an executive vice-president with Novell's Software Group. He declined to comment further.

For its part, Microsoft said little except that its "relationship with Ashton-Tate is stronger than ever." Gates was unavailable for comment, and Microsoft declined to confirm the brouhaha.

The announcement debacle could not have come at a worse time for Ashton-Tate, which has been under great pressure in the last 12 months, thanks to product bugs, shipping delays and an increasingly wary developer community (see story this page).

For Ashton-Tate, SQL Server will both produce new revenue and help bolster Dbase IV, which will also function as a front end to the server. Novell was to have been simply another key distribution partner.

But for Microsoft, SQL server is an ace in the hole for positioning Microsoft's upcoming OS/2 LAN Manager protocols as a standard. "Gates wants the SQL server to be sold on LAN Manager systems only," one source said. In fact, both LAN Manager and SQL Server product managers at Microsoft report to the same boss.

Plot twist?

Ironically, some observers argue that the Novell-Ashton-Tate alliance would benefit Microsoft. Had the deal gone through, it would have guaranteed Microsoft and Ashton-Tate access to Novell's installed base of 2.5 million nodes, measurably boosting SQL Server as a leading database engine standard.

In addition, Novell was expected to alter plans for its own SQL-based server that is still slated to ship in the fourth quarter.

The deal with Ashton-Tate would not only have ensured Novell's support for the Sybase SQL server, but Novell would reposition its own SQL project as a network administration server rather than position it directly against SQL Server, sources close to Novell said.

West Coast correspondent Stephen Jones contributed to this report.

VMCENTER II
Smart Economics.

The Quality experience: overnight savings of over 90%.

Staying profitable while staying competitive. It's the classic challenge. But with the right tools, you can do it.

That's the lesson at Quality Inns International, where astute information systems management has saved money while helping a worldwide organization deliver superior value to its customers.

SAVINGS IN TIME AND RESOURCES.
From menial chores to management reports, VMCENTER II's comprehensive capabilities have made a decisive difference in the caliber and cost-effectiveness of QI's MIS operations.

Take overnight backups. They used to be a nightmare. Now they're a dream. With better than 90% cost savings in both time and tape—plus better reliability than ever.

Or take disk space management: with easy user archiving, there's suddenly room to grow. Add automated scheduling, foolproof tape handling, improved security, and unprecedented control over batch operations, and no wonder QI's systems management is so strongly "VMCENTERed."

VMCENTER II. THE VM SYSTEMS MANAGEMENT TOOL FOR THE FUTURE.
This performance is impressive. But it's only the beginning. With its broad capability and proven performance, VMCENTER II is the most important tool you can buy for *all* your VM systems—from 9370 to 3090 to whatever the future may bring.

VMCENTER II. Your comprehensive solution for today. Your key to long-term success.

For more information, write or call today.

800-562-7100
703-264-8000

VM Software, Inc.
1800 Alexander Bell Drive
Reston, Virginia 22091

VM SOFTWARE INC.

© 1987 VM Software, Inc.

The Quality Choice
Comfort Quality Clarion
Inns · Hotels · Suites · Resorts

1-CWX-881003

NEWS SHORTS

AT&T nixes report

AT&T adamantly denied last week a published report claiming the company would toss aside Sun Microsystems, Inc.'s Scalable Processor Architecture, or Sparc, in favor of another reduced instruction set computing (RISC) microprocessor, the Motorola, Inc. 88000 chip. A spokesman claimed the report was incorrectly pieced together from several innocent incidents, such as the presence of salesmen from Motorola and Intel Corp., both established suppliers to AT&T, in AT&T lobbies. AT&T Bell Laboratories, he said, is researching an assortment of RISC chips for possible product development that would take place years from now.

. . . . . .

IBM ships biggest model

IBM announced Friday the first customer shipment of its most powerful system, the Enterprise System/3090 Model 600S. The system went to CSX Technology, a division of transportation company CSX Corp., where it will be used to manage communications and computing systems at the CSX data center in Jacksonville, Fla., and will link more than 17,000 workstations over a 20,000-mile rail network.

. . . . . .

Ramtek seeks court shelter

Troubled computer-graphics systems maker Ramtek Corp. has filed for reorganization under Chapter 11 of the federal bankruptcy code. The Santa Clara, Calif.-based firm has installed a new management team in an effort to return to profitability and said one significant cost-cutting measure will be a move to smaller headquarters. Founded in 1971, Ramtek employs 300 people and primarily serves OEM customers such as Unisys Corp.

. . . . . .

Disk-dumping charged

The U.S. Department of Commerce last week announced a preliminary determination that Japanese firms are selling 3½-in. diskettes in the U.S. at prices that are 22% to 54% below fair-market value. A final decision in the dumping case, filed by Verbatim Corp., is expected by Dec. 7 and could result in import duties that raise the price of Japanese microdisks. Targets of the investigation are Sony Corp., Hitachi Maxell, Ltd., Fuji Photo Film Co. and other Japanese suppliers.

. . . . . .

DBMS machine from Honeywell Bull

Honeywell Bull rolled out a database machine last week tailored for its GCOS 8 mainframe customers. The Relational Database Computer (DBC) is based on a Teradata Corp. database machine. The system is priced from $365,000 and can also be leased; an entry-level version allows users to store up to 2G bytes of data, and the system can be expanded to one terabyte of data, company officials said. The Relational DBC can be hooked up to as many as 16 Honeywell mainframes.

. . . . . .

Three million and counting

IBM announced last week that worldwide shipments of its Personal System/2 line had reached three million. The system that reached the milestone, a Model 50Z, was shipped out from IBM Australia Ltd.'s manufacturing plant in Wangaratta, Victoria, and is being delivered to the Australian Small Business Association for presentation to that group's "Innovator of the Year," who will be honored in ceremonies in November.

. . . . . .

X/Open rep departs

Robert Ackerman, chief spokesman for the X/Open Consortium, Ltd., resigned recently to launch his own consulting firm, which will provide clients with — guess what? — advice regarding open systems. Ackerman, who has spent the year traveling around the U.S. and Europe promoting X/Open, said he had planned to start his own firm before joining X/Open. Ackerman said Bill Bonin, who headed up the independent software vendors portion of X/Open, will become head of the group's U.S. operations.

OSF makes first cuts on interface submissions

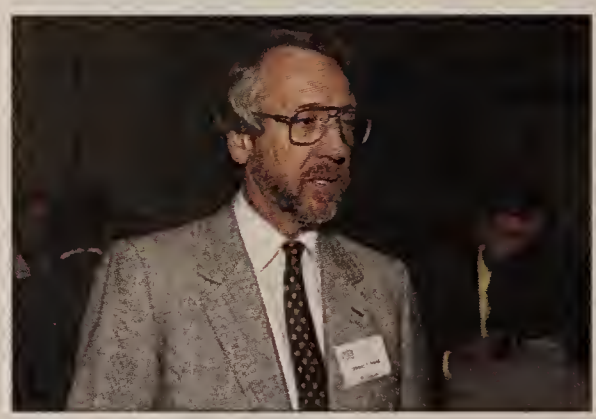
BY AMY CORTESE
CW STAFF

There was no news about AT&T joining, but the mood was upbeat at the Open Software Foundation's (OSF) first general-membership meeting last week.

The companies submitting technologies, especially the smaller ones, had the air of Olympic hopefuls dreaming of making it big.

Twenty-three entries out of 40 total submissions met OSF criteria for a potential standard user interface for the group's planned version of Unix; these proposals will be reviewed further in the next four weeks.

Among those that made the first cut were Digital Equipment Corp., Sequent Computer Systems, Inc., AT&T, Apollo Computer, Inc., Digital Research, Inc. and a joint submission by Hewlett-Packard Co. and Microsoft Corp.



OSF President *Henry Craus*

It is yet to be decided whether the winner will get the gold or share the limelight with silver and bronze, representing more of an alloy. OSF officials have stated that the final selection could be either a complete user interface from one source or a combination of discrete technologies from various sources.

Although OSF members will give their input at a meeting scheduled for Nov. 2-4, it is the OSF staff that will make the final decision at some point afterwards.

Although an announcement regarding AT&T was widely anticipated, at a press and consultants' briefing after the membership meeting OSF officials stated that negotiations with AT&T are still under way and that they were optimistic.

Also at the briefing, John Paul, the OSF's director of development, responded to the constant requests for a timetable and outlined the OSF's agenda for product delivery.

In November, the OSF will receive evaluation code from IBM, which is preliminary code that will eventually make up Release 3 of IBM's AIX. The OSF has said it will base its product on AIX; however the group also stated that that could mean anywhere from one line of AIX code to all of it.

In March 1989, the initial code will be delivered by IBM, and in July 1989 the final code will be delivered by the OSF, with products becoming available sometime in the second half of 1989.

One of the OSF's major efforts will focus on developing an architecturally neutral distribution format, which will allow a common version of the software to be distributed on any hardware platform.

Henry Craus, president of the OSF, also announced three permanent additions to its staff, making a total of six permanent staff members among the 69 transients. Ira Goldstein, one of HP's leading technologists, was appointed vice-president of research. Donal O'Shea was named vice-president of operations and communications. O'Shea was formerly chief executive officer of Unisoft Systems Corp. Patricia Van Blarcum was hired from Apollo to serve as controller.

Goldstein, *recently appointed OSF vice-president of research*

In separate announcements, the OSF last week picked up steam with the addition of Hitachi Ltd. of Tokyo as a new sponsor, as well as 10 new members. Hitachi's joining marks the OSF's ninth sponsor and its first from the Asia-Pacific region.

New members included Advanced Micro Devices, Inc., Booz, Allen & Hamilton, Inc., Micom-Interlan, Inc., Norsk Data AS, Pacific Bell, Silicon Graphics, Inc., Stanford University, The Swedish Telecom Group, Wang Laboratories, Inc. and 88Open Consortium Ltd.

CDC ropes in ETA president for itself

BY JEAN S. BOZMAN
CW STAFF

MINNEAPOLIS — Control Data Corp. last week moved ETA Systems, Inc. President and Chief Executive Officer Carl S. Ledbetter Jr. into the newly created position of vice-president of marketing and sales for CDC's Computer Products Division. The developments came as the $3.4 billion computer vendor anticipated a third-quarter loss in earnings due to sagging mainframe sales.

The move leaves ETA Systems, a supercomputer subsidiary of CDC, with ETA designer Lloyd Thorndyke as chairman. In effect, CDC has called home an estimated $200 million investment in ETA, because Ledbetter now has the task of directing sales and marketing for both ETA supercomputers and CDC Cyber mainframes.

Company spokesmen put the best face on the change, which leaves ETA Systems without a president. "What we're doing is putting Carl's strengths where we need them most right now," company spokesman Tom Charland said. "He will be coordinating marketing and sales for our entire computer line." ETA's vice-president of operations, Al Moeschner, will take on Ledbetter's responsibilities for ETA technical development and administration.

Ledbetter's move parallels the creation of CDC's Computer Products Division in June, Charland said. The June reorganization combined responsibility for Cyber mainframes, engineering workstations and ETA supercomputers under Gil Williams, the division's vice-president and general manager.

Before June, Ledbetter had reported to Thomas Roberts, CDC executive vice-president and president of the division — then called the Computer Systems and Services Group. Since June, Ledbetter had reported to Williams, the spokesman said. "We created an umbrella organization so that supercomputers, workstations and mainframes could be handled together," Charland said.

Ledbetter, who is about 40, has taken a direct hand in selling the ETA systems, which have been shipping since 1987. A former IBM senior scientist and Prime Computer, Inc. vice-president, Ledbetter has been credited with making ETA a viable competitor with Cray Research, Inc. supercomputers.

Software Engineering of America, helping over 6,000 MVS Data Centers Worldwide run more efficiently.

S.E.A.'s DATA CENTER OPTIMIZER software systems

Guarantees you Substantial and Immediate Savings in many of your most critical areas of Data Center Operations.

S.E.A.'s Data Center Optimizer provides unique and unlimited flexibility. Designed by user input, the Data Center Optimizer's components address many of today's critical problem areas. The following is a list of the packages that make up the Data Center Optimizer (all components are also available separately):

PDSFAST/DRIVER – Ultra-high speed DASD/PDS management facility. Completely replaces IEBCOPY. Speeds up SMP, SPF, CICS, IMS & DB2. Interfaces with all existing DASD management systems, adding guaranteed savings in DASD space and resources.

PDSUPDTE – High speed PDS editor.

FASTGENR – Replaces IEBGENER, over 90 times faster using 1/10 the resources.

PRO-2 – Applications development system, generates production ready COBOL code for CICS and database applications with no hooks back into itself.

ODDS – Automates master console management.

$AVRS – Automates handling of Sysout and Syslog. Provides on-line viewing, retrieval and archival of system output. Checks all JCL for errors.

TRMS – A complete, self contained menu-driven report management, distribution and archival system.

VCF/L – Replaces ListC, lets you see exactly what's going on with all your VSAM datasets.

VCF/M – Provides an expert system for the modeling and allocation of VSAM datasets. Generates its own IDCAMS control cards.

VCF/D – An Interactive/Batch program for browsing, editing and analyzing data.

Let us show you Immediate and Substantial Savings with our

FREE – NO OBLIGATION, FORTY-FIVE DAY TRIAL.

Join the over 6,000 MVS users of all sizes who have already discovered a whole new world of efficiency with S.E.A.

FAX: (516) 354-4015 • TELEX: 6973556

SEA

SOFTWARE ENGINEERING OF AMERICA, INC.
2001 Marcus Avenue, Lake Success, N.Y. 11042

For a free trial or more information, call: (516) 328-7000

Founded in 1982, Software Engineering of America, Inc. now has over 6,000 users worldwide. We attribute our success to two basic philosophies:

1. PRODUCTS YOU ASK FOR. Development and enhancement of products based on input from users, like yourself.

2. 24 HOUR RELIABILITY. An unfailing commitment to first rate technical support, 24 hours a day, 7 days a week.

Pillsbury gets brushed by CIO revolving door

BY JAMES CONNOLLY
CW STAFF

Forget about chief information officer being the job of the future. The big money will be in the overtime paid to maintenance personnel who etch the nameplates for the offices of corporate America's constantly changing cast of CIOs.

The latest well-known CIO to shift jobs is John M. Hammitt, vice-president of information management at Pillsbury Co. Hammitt left the food conglomerate for a similar position at United Technologies Corp. Hammitt began work as vice-president of information systems at United Technologies last week.

John Hancock's Boudreau

Hammitt's responsibilities at Pillsbury will be assumed by Carl Wilson, vice-president of MIS at Pillsbury's U.S. foods group.

Hammitt's relocation came on the heels of John Hancock Mutual Life Insurance Co.'s promotion of senior vice-president of information services Edward Boudreau to president of the John Hancock Advisers, Inc. subsidiary. Meanwhile, Chemical Bank promoted Barbara D. Capsalis to chief technology officer from senior vice-president in charge of financial services.

In and out

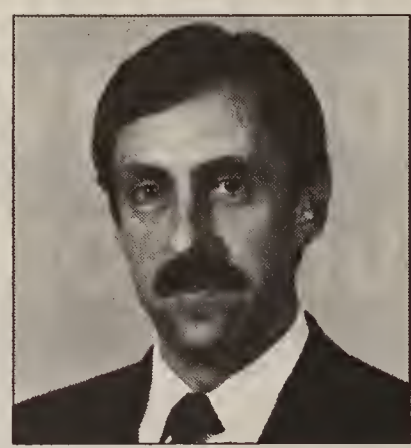
Those changes are the latest in a string of 1988 CIO shifts that include the departure of Kavin Moody from Gillette Corp., Joseph Brophy's move into The Travelers Corp.'s employee benefits group and Michael Simmons' shift from Fidelity Investments to Bankamerica Corp.

But despite the attention paid to CIO turnover, observers said last week it remains unclear whether turnover is greater or just more noticeable this year.

A consultant who deals with MIS executives, The Diebold Group, Inc. Senior Vice-President Michael Webber, said that if turnover is higher, the increase may be attributed to the number of corporate takeover attempts.

If successful, takeovers can turn an MIS group into excess baggage. Even if a company defends against a takeover, as Gillette did, the cost can mean cutbacks in budgets and disenchantment at the CIO level.

"I don't have any hard numbers, but if you look at a list of the 100 largest MIS budgets and the so-called CIOs in those organizations, there is a large amount of movement out there," Webber noted. He said he also senses that some of the activity involves a drive into CIO-type positions by executives with little MIS background but extensive general business experience.



United Technologies' Hammitt

Jim Hall, a principal at Cambridge, Mass.-based Index Group, Inc., also cited the trend toward nontechnical CIOs and noted that the result for those with strictly MIS backgrounds could be a lateral career path into non-MIS jobs.

"I think there is a lot more flux in IS in general this year. I can see it just in the amount of business and the type of business we have," Hall said, noting that companies are restructuring the information systems groups because of the merger wave and the 1987 stock market crash.

At Pillsbury, Wilson credited his predecessor, Hammitt, with "unfreezing" the corporate attitude toward information systems. "He found a situation where information technology was thought of as an expense," Wilson said. "He had to make sure senior management understood the capabilities of information technology and how it could contribute to the bottom line."

Wilson has spent most of his life in MIS and strategic planning. "I came up through the MIS ranks, starting right out of high school as a third-shift electronic accounting machine and computer operator. I have sat in virtually every position in the business," said the 41-year-old Ohio native. He spent several years with Pepsico, Inc. and Cenex in Minneapolis.

The CIO changeover at John Hancock was driven by the planned 1989 retirement of Vice-Chairman R. Bruce Oliver, who serves as chief executive officer of John Hancock Advisers.

Boudreau took charge of John Hancock's MIS group less than two years ago after serving as corporate treasurer and president of the company's retail banking subsidiary. Boudreau supervised the decentralization of John Hancock's systems development efforts, which included reassignment of developers to business units. No successor was named.

DEC clues hidden in VMS?

BY WILLIAM BRANDEL
CW STAFF

A file buried in the latest version of Digital Equipment Corp.'s VMS operating system provides new evidence that DEC plans to broadly expand its line of symmetrical multiprocessing computers as it continues its drive into IBM's transaction processing turf. The file lists as-yet-unannounced VAX models that industry analysts said include an eight-processor version of the VAX 6200 series and an assortment of workstations.

Among the unannounced product names listed in the file are the VAX 6250, 6260, 6270 and 6280. DEC's current 6200 product line spans four models, from the 6210 to the 6240. This series incorporates one to four CPUs with 2.8 million instructions per second (MIPS) and was specifically designed for VMS 5.0's multistreaming capabilities, essential for transaction processing on a VAX.

The new model numbers indicate that this series will be expanded to a five- and six-processor offering by year's end to meet customer demand, according to Hans Marquardt, an analyst at Framingham, Mass.-based International Data Corp.

A DEC spokesman denied that the file is a VAX/VMS product list, saying it is actually "comments made by engineers who develop and maintain the code in VMS 5, which should have been deleted."

The VMS file also lists a VAX 6205 series ranging from a VAX 6215 to a 6285. Analysts said the numbers apparently refer to field-upgradable 4- to 6-MIPS processors that DEC is expected to introduce as boosters for the VAX 6200 series early next year.

The file lists six different configurations of a product called Firefox. Analysts said Firefox is the code name for DEC's first multiprocessing workstation, which they expect to come out around year's end in conjunction with a symmetrical multiprocessing version of Ultrix-32.

UTAH COBOL™

NEW VERSION 5.0
$69.95

For IBM® PC's, XT's, AT's and other DOS machines. Needs only 1 disk drive and 256K memory. This is the one you've heard so much about - with fast compile times, small object code modules, not copy protected, no royalties, and clear error messages. Version 5.0 is based upon ANSI-74 standards with new dynamite features including:
• Nested IF's and nested conditions.
• Indexed files (ISAM) with up to 24 keys (includes START verb). This advanced feature requires the software package Btrieve® which is optionally available.
• ACCEPT (line, column) numerics with decimal point alignment, numeric checking, AUTO-SKIP, SECURITY, LENGTH-CHECK, EMPTY-CHECK, ATTRIBUTE (color), FROM ESCAPE KEY, DAY, DATE, TIME, DAY-OF-WEEK.
• Fast memory mapped DISPLAY's (line, column) ERASE, BEEP, ATTRIBUTE (color). Can display entire screen with one DISPLAY statement.
• Windowing, pop-ups, color and overlays. This advanced feature requires the software package Saywhat?!™ which is optionally available.
• An easy to use, COBOL source code EDITOR with auto line numbering, A-margin, B-margin tabing with full screen cursor control.
Also available: Utah **SuperSort**®, a fast sort program callable from Utah COBOL; Utah **FORTRAN**; Utah **BASIC**; Utah **PASCAL**; Utah **PILOT**. Used by 50,000 professionals, students and teachers in 40 countries. 30-day money back guarantee. Discover the ease and simplicity of Utah COBOL, today!

Phone order rushed by UPS 2nd Day Air:
(702) 827-3030

Since 1977
Ellis Computing, Inc.
5655 Riggins Court, Suite 10
Reno, Nevada 89502

IBM is a registered trademark of International Business Machines, Inc. Btrieve is a registered trademark of Novell, Inc. Saywhat?! is a trademark of The Research Group. SuperSort is a registered trademark of Micropro International Corporation. Utah COBOL is a trademark of Ellis Computing, Inc. © 1988 Ellis Computing, Inc.

VMSQL/REORG: Your Ticket to a Weekend Away From Work

With VMSQL/REORG, reorganizing IBM's® SQL/DS was never so easy.

VMSQL/REORG lets you:
- ☐ Reorder data for clustering indexes
- ☐ Reclaim empty storage pages
- ☐ Save and recreate views, grants
- ☐ Alter DBSPACEs, tables, indexes
- ☐ Unload and reload data easily
- ☐ Redistribute tables across DBSPACEs.

Reclaim your weekends with VMSQL/REORG.
800-562-7100 in the U.S.
800-533-5128 in Canada, or
703-264-8000

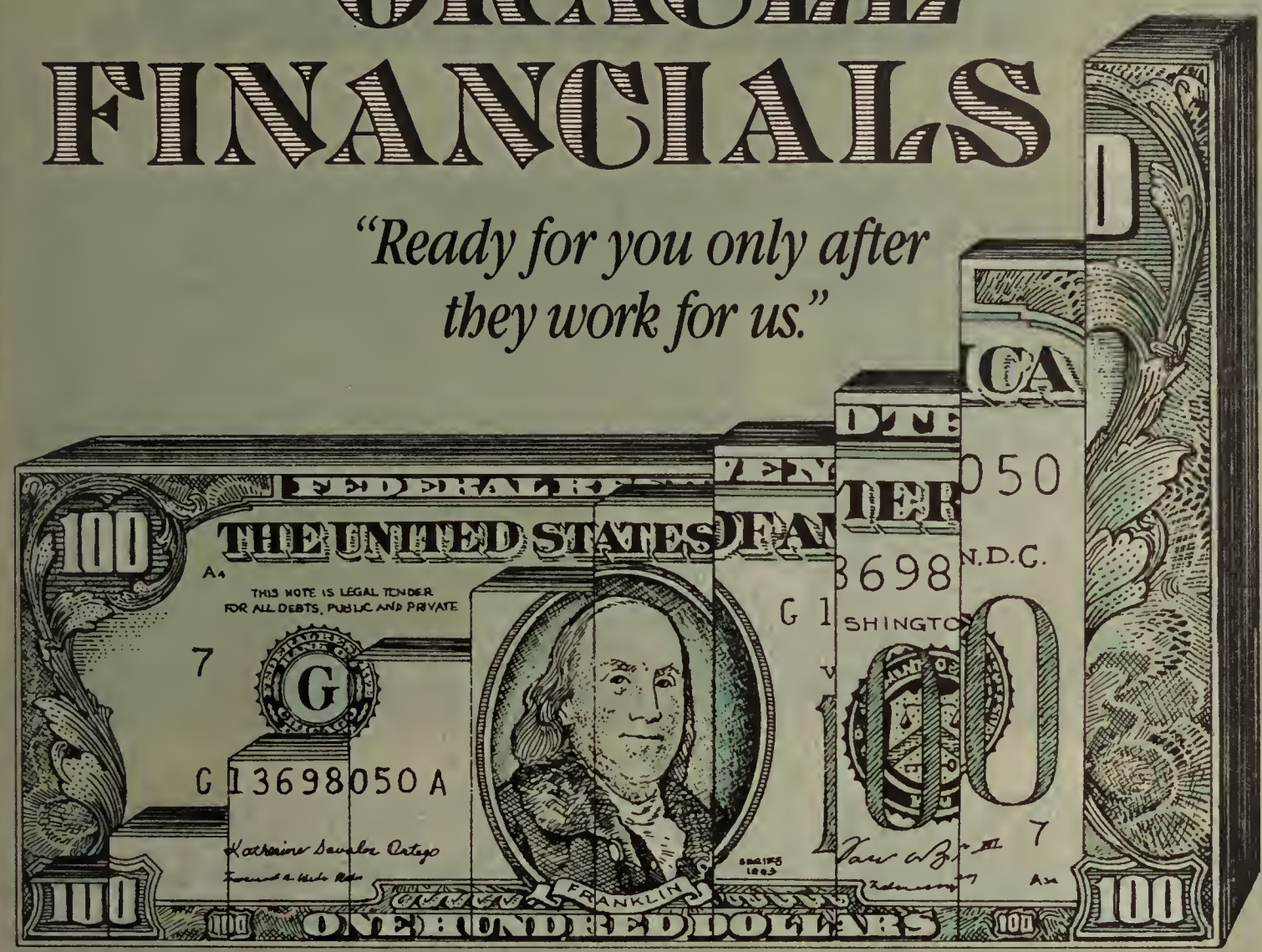
APPLIED RELATIONAL TECHNOLOGY
A Division of VM Software, Inc.
1800 Alexander Bell Dr., Reston, VA 22091

IBM® is a registered trademark of International Business Machines Corporation
6-CWX-881003

Announcing

ORACLE FINANCIALS

"Ready for you only after they work for us."



Oracle Financials

Oracle General Ledger,™ Oracle Payables,™ Oracle Purchasing™ and Oracle Assets™ applications have world-class functionality, yet are so easy to use that you may not bother to read documentation. Not only can they do anything you need to do, but they do it effortlessly and on the computer of your choice—mainframe, minicomputer or workstation—at the location of your choice.

"...Oracle Financials seem too good to be true. They offer full-featured accounting capabilities... without having to write any applications."
— Howard Ember, Treasurer, Tootsie Rolls

The best software quality control in the world

"By being the very first production user, Oracle demonstrated their absolute confidence in the financial software they intended to sell. This quality control alone makes Oracle Financials worth a close look."
— David Thomas, Hambrecht & Quist

In three years, Oracle's sales grew from $25 million to almost $300 million. They went from 1000 customers to over 10,000, from 2 products to over 100, from $15 million in total assets to over $250 million with several major corporate reorganizations along the way. Oracle Financials were there every step of the way.

"Oracle Payables is one of the few packages we evaluated that can really deal with the demands of a very large company. And by being able to implement Oracle Financials on our existing minicomputers, we saved $500,000 over the cost of other alternatives."
— Michael Prince, Data Processing Manager, Burlington Coat

"The flexibility of Oracle Financials lets us focus on our company's growth, not our accounting systems. Whatever your industry, whatever the size of your company, we are certain that these products will work for you. ***We invite you to attend the next Oracle Financials briefing and demonstration in your area."***
— Jeffrey L. Walker, Senior VP, CFO Oracle Corporation

Copyright © 1988 by Oracle Corp. Oracle Financials, Oracle General Ledger, Oracle Payables, Oracle Purchasing and Oracle Assets are trademarks of Oracle. TRBA

ORACLE®

Call 1-800-345-DBMS, ext. 8110 today.

20 Davis Drive, Belmont, CA 94002 • World Headquarters (415) 598-8000 • Calgary (403) 265-2622 • Ottawa (613) 238-2381 • Quebec (514) 337-0755 • Toronto (416) 596-7750 • ORACLE Systems Australia 61-2-959-5080 • ORACLE Europe 44-1-948-6911 • ORACLE Systems Hong Kong 852-5-266846

Oracle Financials Seminars

ARKANSAS
- Little Rock ..... Oct 13

ARIZONA
- Phoenix ..... Oct 13, Nov 8, Dec 8

CALIFORNIA
- Costa Mesa ..... Oct 4, Nov 11
- Los Angeles ..... Nov 15, Dec 13
- Oakland ..... Oct 6
- Sacramento ..... Nov 10
- San Diego ..... Oct 6, Nov 3
- San Francisco ..... Oct 11, Dec 13
- San Jose ..... Oct 26

COLORADO
- Denver ..... Oct 27, Dec 20

ILLINOIS
- Chicago ..... Oct 11, Nov 16, Dec 13

INDIANA
- Indianapolis ..... Nov 17

LOUISIANA
- New Orleans ..... Oct 28

MASSACHUSETTS
- Boston ..... Oct 12, Dec 13

MICHIGAN
- Detroit ..... Oct 4, Dec 7

MINNESOTA
- Minneapolis ..... Oct 19, Dec 13

MISSOURI
- Kansas City ..... Oct 18
- St. Louis ..... Oct 6, Dec 8

NEW JERSEY
- Iselin ..... Dec 15
- Princeton ..... Oct 4

NEW YORK
- New York City ..... Oct 12, Dec 7

OHIO
- Cleveland ..... Oct 19

OKLAHOMA
- Tulsa ..... Oct 25

OREGON
- Portland ..... Nov 15

PENNSYLVANIA
- Pittsburgh ..... Oct 26

TEXAS
- Austin ..... Oct 20, Dec 1
- Dallas ..... Nov 15
- Houston ..... Dec 7
- San Antonio ..... Oct 21

WASHINGTON
- Seattle ..... Oct 20

WISCONSIN
- Madison ..... Oct 5
- Milwaukee ..... Oct 12

Attn: National Seminar Coordinator
Oracle Corporation
20 Davis Drive
Belmont, California 94002
1-800-345-DBMS, ext. 8110

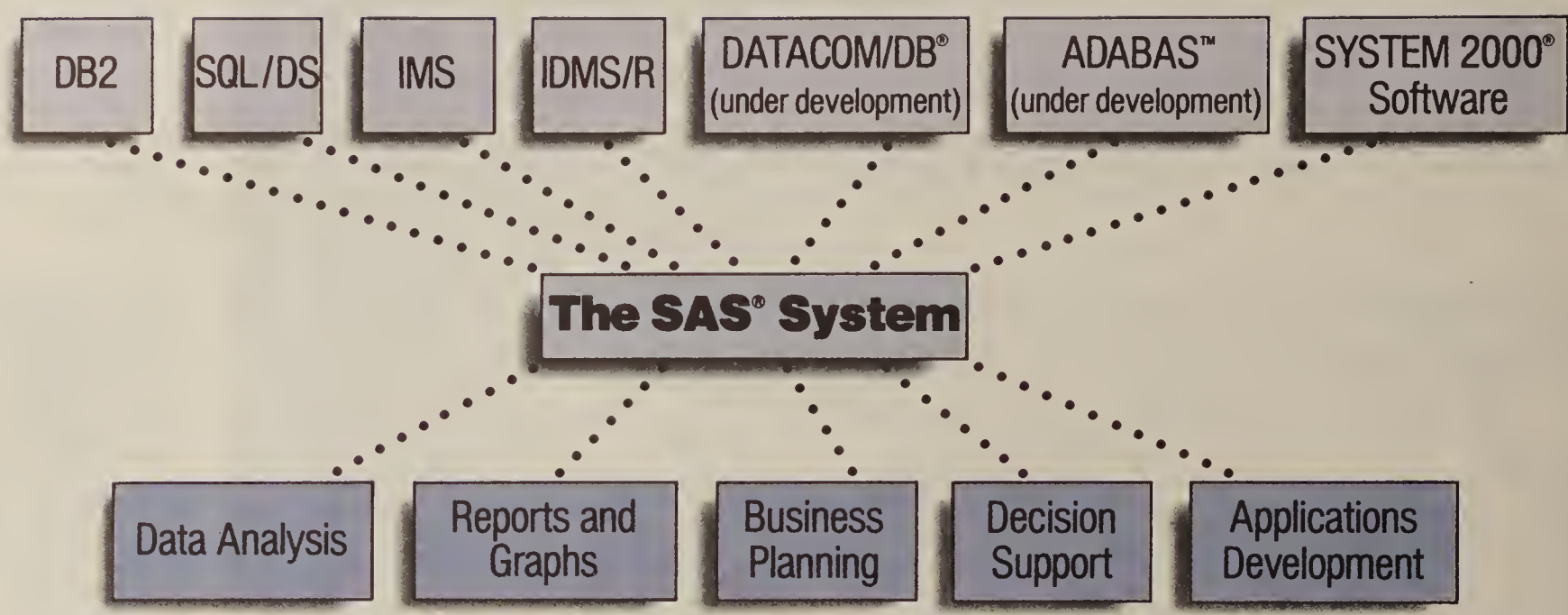
☐ My business card or letterhead is attached. Please enroll me in the *FREE* Oracle Financials seminar to be held

at: _____

on: _____

COMPUTERWORLD

Get the Facts from Your DBMS.



The most powerful applications software has joined forces with the most popular data base management systems. To turn raw data into meaningful facts. To analyze, estimate, optimize, simulate. To produce custom reports and color graphs. Whatever your information need, the SAS System delivers more from the data you store.

Don't Just Store Your Data. Explore Your Data.

The SAS System's ready-to-use tools uncover the real meaning of all those names and numbers. Forecast sales and cash flow. Perform statistical analyses. Build financial and planning models. Create spreadsheets of unlimited size. Schedule projects for best use of time and resources. Produce stacks of personalized letters. Generate calendars, charts, and many other formatted reports. Spot relationships and graph trends with powerful presentation graphics.

Or develop your own applications with the SAS System's efficient fourth-generation language. Customize these applications any way you wish.

If You Know Data Bases. And Even if You Don't.

Menu-driven interfaces link the SAS System with DB2, SQL/DS, IMS, or IDMS/R data bases, and with SYSTEM 2000® Data Management Software. End users, even those who know nothing about data bases, have immediate access to the data they need. It's as easy as filling in the blanks!

Extract data from your DBMS for use in SAS System applications. Load data from the SAS System directly into your DBMS. Update values in a data base directly from a SAS System application. All without risk to data security. The SAS System lets you choose which users browse or update specific files.

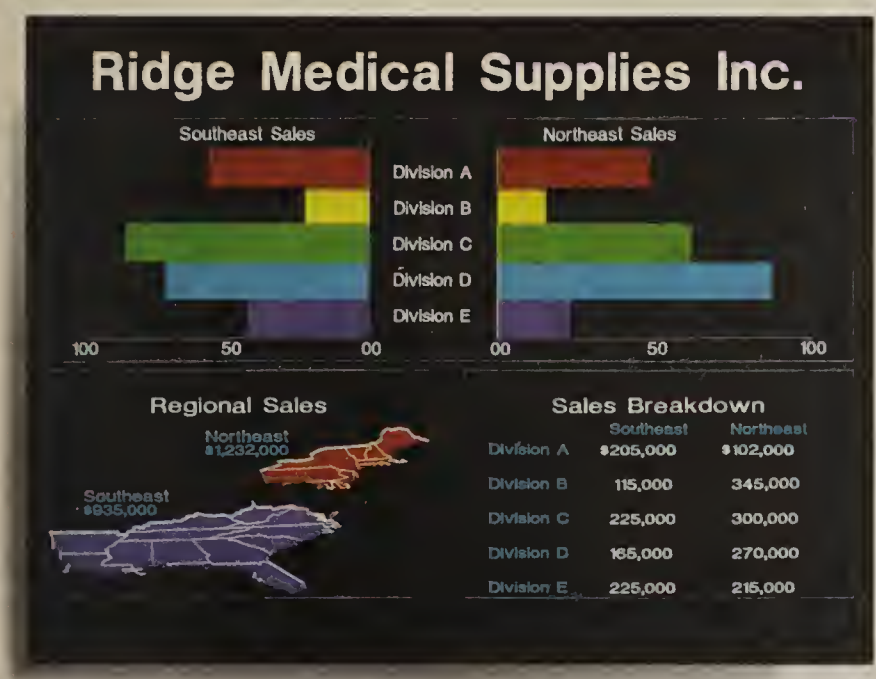
Get the Facts Today. And Get 30 Days FREE.

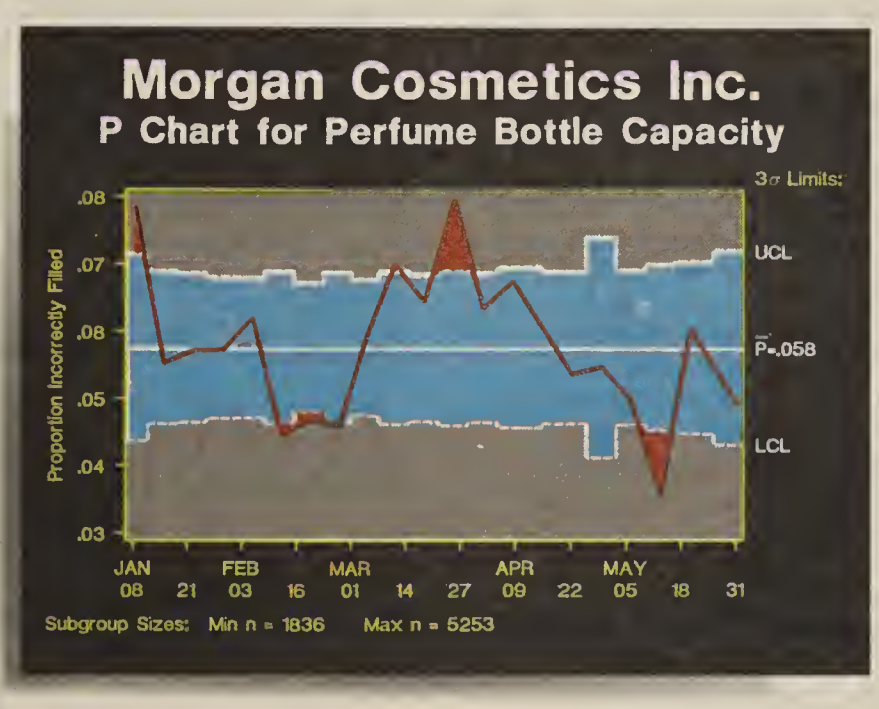
Bring the SAS System together with your data base. You'll receive high-quality software—plus training, documentation, and support—all from SAS Institute Inc. We'll even provide a free software trial to get acquainted. For details, call or write today.

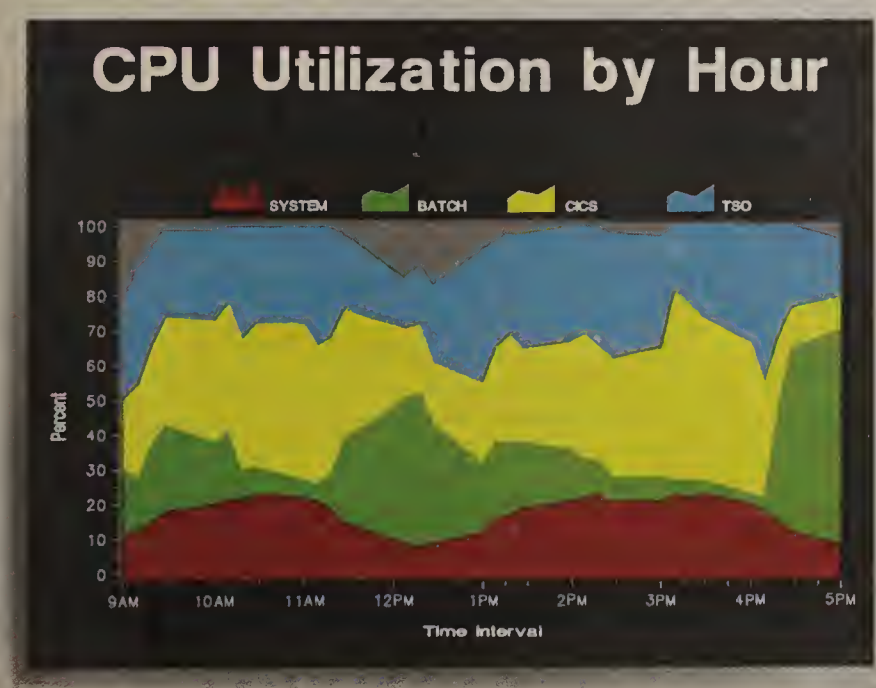
SAS®

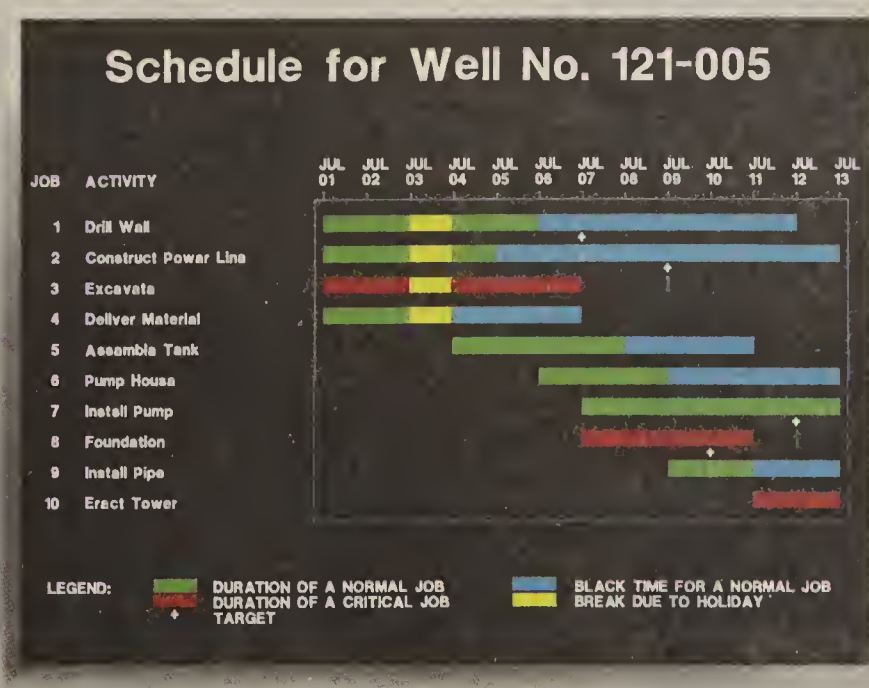
SAS Institute Inc.
SAS Circle ☐ Box 8000
Cary, NC 27512-8000
Phone (919) 467-8000
Fax (919) 469-3737

Get the SAS® System.









The SAS System runs on IBM Corp.'s 370/30xx/43xx and compatible machines, as well as minicomputers and personal computers.

SAS and SYSTEM 2000 are registered trademarks of SAS Institute Inc., Cary, NC, USA. DB2, SQL/DS, and IMS are products of IBM Corporation, Armonk, NY. IDMS/R is a product of Cullinet Software, Inc., Westwood, MA. DATACOM/DB is a registered trademark of Applied Data Research, Inc. Princeton, NJ. ADABAS is a trademark of Software AG, Reston, VA.

Copyright © 1988 by SAS Institute Inc. Printed in the USA.

Software rental furor

Test drive or license to pirate? Publishers, sellers disagree

BY MICHAEL ALEXANDER
CW STAFF

Should companies and consumers be allowed to rent computer software?

No, say software publishers who claim that rentals are merely a front for software piracy.

Yes, say retailers and mail-order firms that claim the practice will enable companies and consumers to try software before they buy.

Software rental is legal, but a bill under consideration by the Senate Subcommittee on Patents, Copyrights and Trademarks may close what some say is a loophole in the copyright law. The Computer Software Rental Amendment of 1988, introduced last month by Sen. Orrin Hatch (R-Utah), would amend the U.S. Copyright Act to block unauthorized software rentals.

Try, try again

The bill is the latest attempt by the software industry to prohibit rentals. With Congress preparing to adjourn in October, however, the chance of the bill's passing is remote, said Ken Wasch, director of the Software Publishers Association. Plans are already under way to submit yet another bill in January, he said.

The software industry is not certain how much of its revenue is lost to piracy as a result of software rentals, which is one reason there has not been broad industry support for the current bill or similar ones submitted to Congress in 1984, 1986 and 1987. Until last year, the software industry was content to rely on the shrink-wrap license routinely packaged with computer software as its primary defense against rentals and illegal duplication of software.

In March 1987, a federal district judge tossed out a Louisiana law that validated shrink-wrap software licenses, saying the legislation violated a copyright law that lets users make backup copies.

Another reason the industry has not taken software rentals more seriously is that the business has been a rather small and isolated problem, said Jeff Tarter, editor and publisher of "Softletter."

"I have never heard of any software rental company that has ever made any money," Tarter said. "Several companies have tried it but went bankrupt before the lawyers could attack."

The risk that someone will figure out how to do it is mounting, he added.

Legal observers predicted a law will be passed that will prohibit software rentals, if for no other reason than that the economics of the computer software business mandates a legal solution. Unlike the video rental business, in which consumers are not as apt to duplicate prerecorded movies, it is remarkably easy and inexpensive to copy software.

"In order to encourage companies to invest in new products and expend their creativity, the creator has to be assured that he will recover the cost. Locally [in the Boston area], there is a store called Unitech that gives away public domain software when you buy equipment," said Lee Gesmer, an attorney at Lucash, Gesmer and Updegrove in Boston. "Can you imagine what would happen if stores like that sprang up coast to coast and rented Lotus' 1-2-3, Wordperfect and Dbase III? There would be a vast distribution of illegal software that would cost the industry billions and billions of dollars."

Software publishers have never been able to substantiate their claims of piracy from software rentals, countered Real Provencher, president of Software That Fits, a mail-order firm in Humble, Texas.

His firm does not rent software, he said, but offers a "trial purchase" to end users who want to try software before they buy. The buyer has 16 days to evaluate the software for an amount approximately equal to one-third of the purchase price. The company sells Aldus Corp.'s Pagemaker 3.0, for example, for $429 and offers it for trial purchase for $113.

Software rental goes a long way toward reducing piracy, Provencher said: "Up until software rental became available as a mode to try software, the only way to do it was make a copy. There would not be a need for software rentals if software publishers were required by law to provide a money-back guarantee."

"Would you pay a third of the purchase price of a program to rent it for a week just to check it out?" Tarter said.

Cut Through Applications Backlog Fast With INGRES Relational Database.

© 1988 Relational Technology Inc. Printed in U.S.A.

Software AG unleashes tools

BY AMY CORTESE
CW STAFF

NASHVILLE — Software AG of North America, Inc. announced a slew of new and enhanced products at its annual users conference here last week, along with support of a new hardware platform.

The company announced an Apple Computer, Inc. Macintosh-based front-end computer-aided software engineering (CASE) tool; text processing software for IBM environments; performance enhancements for Adabas, its database management system; and enhancements to fourth-generation language performance and security capabilities for its Natural on the Digital Equipment Corp. VAX. The firm also announced availability of its database, language and CASE tool software on Wang Laboratories, Inc. VS environments.

The company introduced two products that make up an integrated database/communications high-performance environment for Adabas. The High Performance Environment (HPE) and Adabas Transaction Processing Facility (TPF) were designed to integrate database management and transaction management; this is similar to the concept of IBM's DB/DC environment.

Both products will be available in the fourth quarter, the vendor said. Adabas TPF is priced from $5,700 to $34,000, and Adabas HPE is priced at $36,000 for IBM's MVS and 15% higher for IBM's ESA.

The move to the Wang VS environment is more significant to Software AG's European business, said Scott McLarnon, director of software at International Data Corp. in Framingham, Mass. The Wang environment is used much more as a general-purpose business machine in Europe, where Software AG is very strong, he said.

The database products are set to be available on the Wang this month, with prices ranging from $3,000 to $60,000, depending on product and platform.

Xerox leaps into presentation fray

BY STEPHEN JONES
CW STAFF

SAN DIEGO — Desktop publishing giant Xerox Corp. last week cast its vote of support for the desktop presentation market by announcing Xerox Presents, a software program that makes flashy business presentations.

Xerox Presents is a Microsoft Corp. MS-DOS version of a similar graphics product from Cricket Software, Inc. that runs on Apple Computer, Inc.'s Macintosh. Cricket, content to stick with the Mac, agreed to give Xerox worldwide marketing rights to versions of its products that run on DOS- and OS/2-based personal computers.

The $495 program is aimed at business users who want sharp-looking overhead transparencies or slides but do not have the time or talent to produce such presentations. Xerox Presents ships with a runtime version of Microsoft's Windows, which provides what-you-see-is-what-you-get screen displays of graphics.

Users can take shortcuts in creating a slide by using automated style sheets with preset colors, fonts and layouts.

May be a jolt

Xerox's announcement comes on the heels of Aldus Corp.'s entry last month into the desktop presentation business. The recent addition of these two desktop publishing leaders could help jump-start the desktop presentation market, which has not met expectations of greatness.

"Not a lot has happened after all the hoopla over desktop presentations last year. But if anyone had doubts whether the desktop presentation business was real before, these announcements should answer that," said Craig Cline, associate editor of the "Seybold Report on Desktop Publishing."

Xerox made a big splash in desktop publishing by acquiring marketing rights to Ventura Publisher, but the company has not developed or acquired any additional products.

With plans to market other Cricket products, including Graph and Draw, Xerox has bought its way into another graphics market. "The combination of Cricket's products and Xerox's marketing clout could result in a real winner," said Bill Higgs, director of software research at Infocorp in Cupertino, Calif.

To design, build, and maintain effective business applications, you need the right tools and development options. INGRES combines Tools, Power, and Access to help you cut through development backlogs. In addition, hundreds of ready-to-use INGRES-based business solutions are available.

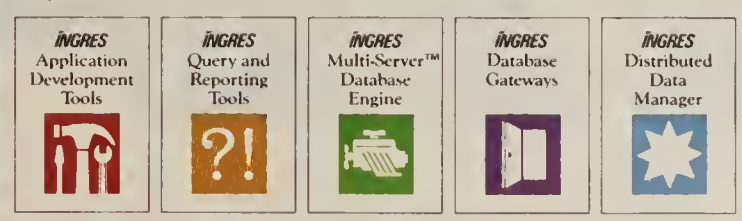
Tools INGRES offers an unmatched integrated application development environment providing CASE, 4GL, SQL and visual programming methods. These facilitate complex applications prototyping, deployment, and provides independent end-user query and reporting capabilities. Applications are instantly portable across multiple hardware platforms.

Power INGRES high performance SQL database engine provides OLTP power to support production applications in single or multi-CPU and distributed environments. A unique AI-based query optimizer maximizes processing efficiency.

Access INGRES integrates existing data into your applications through flexible access tools. Gateway access to existing data. Network access to tie your systems together. The most advanced distributed technology to integrate islands of information. Access to your data wherever it resides.

Find out how 12,000 installations have cut through their applications backlog fast with INGRES Development Tools. Attend a free INGRES seminar.

Call 1-800-4-INGRES



See us at Info 88, #151 and DEXPO West, #2347

INGRES
RELATIONAL TECHNOLOGY

Corporate Headquarters: 1080 Marina Village Parkway, Alameda, CA 94501, (415) 769-1400
International Headquarters: Anchor House, 15-19 Britten Street, London SW3 3TY, UK, +44 1 351 7722

CW

IBM storage boost seen halfhearted

BY ROSEMARY HAMILTON
CW STAFF

IBM put some polish on both its 3480 tape storage and 3990 storage controller lines last week, but analysts said the move was a halfhearted attempt to improve the products.

On the tape storage front, IBM cut prices on all 3480 models by 12% to 17% while also boosting the performance of the 3480 Model A22 control unit. In addition, the company sketched out some plans for future 3480 performance improvements that should turn into real products sometime next year.

At the same time, IBM moved the delivery date of its 3990 Model 3 with cache capability to mid-December. Earlier this year, IBM said it would not meet its 1988 third-quarter shipment date for this controller and would instead begin shipping it in the first half of 1989.

While the new date is an improvement, the Model 3 will not be shipping with Extended Features, which should really make the product hum, according to analysts.

Extended Features, which consist of the DASD Fast Write and Dual Copy capabilities, will ship under an Early Customer Support Program sometime in the first half of 1989. With that schedule, observers said, it will likely be late 1989 or early 1990 before users see a fully functional Model 3.

However, William Noble, IBM's manager of storage products marketing, said the model shipping in December is a functional product with cache capability and should not be considered partially complete.

Not fully functional

"It's absolutely not fully functional," said David Vellante, director of storage research at International Data Corp. in Framingham, Mass. "It would be difficult for us to recommend the purchase of a Model 3 without the Extended Features."

DASD Fast Write would allow data to be sent at channel speeds to cache and battery-powered storage. This eliminates the need to transfer data to a direct-access storage device immediately, as is now required. Dual Copy allows a user to create two copies of data, one of which can serve as a backup. Both are automatically updated, and the second is immediately available if the first is lost, IBM said.

The 3480 announcements, analysts said, were expected responses to competitors such as Storage Technology Corp.

"It was only a matter of time before IBM cut prices to put a squeeze on," said Michael Peterson, president of Peripheral Strategies, Inc. in Santa Barbara, Calif. The 12% to 17% cuts apply to the Models A11, A22, B11 and B22 as well as other components in the 3480 Magnetic Subsystem product line, including the Automatic Cartridge Loader. With the new pricing, for example, the A22 will sell for $56,930, compared with the product's earlier price of $68,590.

The A22 will also get two performance improvements, which should be available in mid-November. The control unit's data rate will be increased from 3M to 4.5M char./sec., while its buffer storage will be doubled from 1M to 2M bytes.

Current A22 users can pick up the new features for $5,500. After Nov. 18, the A22 will ship standard with those improvements.

Meanwhile, IBM sent a cryptic message to customers that bigger and better things will be available next year for the 3480 product line.

IBM's Noble would not provide details, but he said that the company intends to increase the data cartridge capacity 300% to 500% and to boost the tape subsystem's overall performance as much as 50%.

Oracle squeezes into the crowded applications market

BY AMY CORTESE
CW STAFF

When Jeff Walker, founder of Walker Interactive Systems, joined Oracle Corp. in December 1985, the signal should have been clear. However, nearly three years later, as Oracle announced its entry into the financial products market, many were surprised.

Oracle launched its assault on the financial applications market Tuesday with the introduction of Oracle Financials, a suite of four accounting packages consisting of General Ledger, Payables, Purchasing and Assets. The products are available immediately for Digital Equipment Corp. and Sequent Computer Systems, Inc. machines.

Walker, senior vice-president and chief financial officer of Oracle, spearheaded the effort. His former company, which still bears his name, came to fame with accounting applications for IBM mainframes.

According to many, the financial products market is a mature and saturated market. Certainly it is a crowded one.

However, Oracle's Walker said he sees a parallel between the accounting software market today and the database management system market five years ago: old technology, dominated at the high end by large, well-entrenched vendors and fragmented at the mid-range with no real dominant leader.

Oracle hopes to capitalize on what it sees as a trend of large organizations moving off mainframes to smaller and more powerful machines and shifting to more decentralized management styles. Simply put, Oracle is hoping to do to the accounting market what it has done to the database market.

It will start by selling into its largest customer base: DEC VAX users. Sequent was also chosen as an initial platform because Oracle has been running the software for its own use on Sequent machines for a year now.

Oracle reported that it intends to eventually offer the software on all platforms that run the Oracle DBMS. According to Walker, it takes only two weeks to port the software to a new environment.

Aggressive growth plans

The announcement marks the latest move in Oracle's aggressive growth plans. In the past year, the company entered the computer-aided software engineering market with new software tools and announced several marketing agreements, support of new platforms, a major release of Oracle and the establishment of a systems integration subsidiary. Oracle last week reported a 120% increase in its first-quarter earnings compared with the previous year's quarter.

According to Oracle, there are currently 15 customers who also beta-tested Oracle Financials. They include Sequent in Beaverton, Ore., Burlington Coat Factory Warehouse Corp. in Burlington, N.J., and the Tootsie Roll division of Charms Co. in Chicago.

Pricing for Oracle Financials depends on the hardware platform and is priced the same as the Oracle database kernel. The current VAX and Sequent prices will range from $4,000 to $166,000. Future IBM mainframe versions will be priced at up to $180,000.

MAKE YOUR CONVERSION smooth sailing

1-800-367-2687

CTG

COMPUTER TASK GROUP INC.
DATAWARE CONVERSION SERVICES
3095 Union Road, Orchard Park, New York 14127
(716) 674-9310 TELEX: 510-100-2155

Do-it-yourself conversions are a sink or swim proposition.

Before your DP staff sails the uncharted waters of a vendor-to-vendor mainframe conversion, call the seasoned conversion specialists at CTG/Dataware. After hundreds of successful conversions for companies like yours, our expert conversion crew has the tools, the expertise, and the experience to keep your conversion on course, on schedule, and on budget.

Don't wait till you're in over your head. Take a minute *now* and call toll-free 1-800-367-2687. Ask for the Smooth Conversion specialists.

Smooth Conversion

The most important link in our business software system.

Today everyone talks about connectivity. Computers talk to each other. And business software companies talk about their latest advances in bringing it all together.

But despite their technical skill in linking PCs, mainframes and mid-range systems, most software companies fail to see the importance of connecting with you. And everyone else in your company who touches a keyboard.

The result? Inflexible business applications that cause nothing but confusion. As people struggle to learn the software, meet tight reporting deadlines, and stay out of your DP shop's way all at the same time.

At McCormack & Dodge, we made the connection with people years ago, and Millennium® was the result. Business software that allowed people to work in a truly integrated computing environment.

Now, that technology has evolved into customer-controlled software. A line of business applications you can easily tailor to your individual needs.

Consider our General Ledger package. A retailer might turn it into a weekly stock ledger, while someone in the Oil & Gas industry sets it up for project reporting. On the other hand, our PC Link software lets any user develop custom menus, and follow a work flow that best reflects their business.

It's all accomplished without the customary confusion. And it all comes from a software company consistently rated by Fortune 500 executives as a top vendor in overall service and support.

If there's a missing link in your business software system, maybe you should consider customer-controlled software. To find out more about it, or any of our Financial, Human Resource, Manufacturing, and Application Development systems, call McCormack & Dodge at 1-800-343-0325.

We put the customer in control of the software.

McCormack & Dodge

a company of The Dun & Bradstreet Corporation

© 1988

We put the customer in control of the software.

Insurer samples optical disk transfer

BY ALAN J. RYAN
CW STAFF

DALLAS — Lomas Financial's recent routine purchase of 50,000 home mortgage loans from Citicorp Mortgage in St. Louis took an interesting twist when Citicorp transferred many of the documents on optical disk rather than sending a tractor-trailer filled with paper.

By using optical disk technology, Lomas saved $60,000 to $75,000 and got the job done within days — as opposed to the eight weeks it would normally have taken to complete the transaction, according to Tom H. Carter, senior vice-president of Lomas Insurance Services.

But because both Citicorp and Lomas are among the 160 companies worldwide that have Filenet Corp.'s document image processing system in place, the process was easy.

Citicorp "took a platter off their Filenet system, shipped it to us, and we put it in our Filenet system," said Matt Jacobs, executive vice-president of data processing at Lomas Mortgage U.S.A.

Although the actual mortgage contracts were not handled through Lomas' Filenet system, there were 50,000 corresponding hazard insurance policies that were. "Normally, when buying and selling mortgages, there is a tremendous exchange of paper and three or four months of confusion," Carter said.

Carter said the information was available to the firm's end users within five days.

The technology potentially gives Lomas an advantage when bidding for loans, Jacobs said. However, because the installed base of Filenet systems is low, Lomas' advantage may be solely with Citicorp.

When both the seller and the buyer have Filenet, "I can bid more for your loans and pay you a higher price because my cost of acquiring it is lower, but my net isn't going to change," Jacobs said.

The exchange was not hampered by legal snags because the insurance information is treated as facsimile information, Carter said. "It is not purported to be original documents. If it were the mortgage or deed of trust, that would be different." The information exchanged in this method would only be used to furnish proof that insurance coverage exists, he added.

"Future growth path? Flexibility?
No sweat...we can add anything Noogie ever makes."

LEASAMETRIC
Data Communications

Unlike some companies, Leasametric lets you choose exactly the network products, PCs, and peripherals you need. From the best multi-vendor selection in the country. And get the best on-going service, too. Just call the Leasametric office nearest you.

Northwest: (800) 343-7368, (415) 574-5797 • Southwest: (800) 638-7854, (818) 708-2669 • Central: (800) 323-4823, (312) 595-2700
Northeast: (800) 221-0246, (201) 825-9000 • Southeast: (800) 241-5841, (404) 925-7980

© Leasametric, Inc. 1988

TI to let loose mid-range volley

BY ROSEMARY HAMILTON
CW STAFF

AUSTIN, Texas — Texas Instruments, Inc. will launch its latest assault on the mid-range market today with a package that it hopes will go a step beyond what any competitor offers.

The system and service package features a high-end computer said to support up to 256 users, twice as many as are supported by the current high end of its Series 1000. But the real sizzle to this package is a lifetime warranty option in which the company promises to replace free of charge all CPUs, memory and power-supply components for the lifetime of a system.

Such a lifetime deal is very rare. Most mid-range system vendors typically offer warranties of several months, while Digital Equipment Corp. has a one-year warranty plan.

"To the best of my knowledge, nothing like that is being offered in that market," said Greg Cline, a senior analyst at The Yankee Group in Boston. "It differentiates them, and in the mid-range market, any way you can do that is a real plus."

The warranty applies to the new high-end System 1580 as well as to the three reconfigured models of the System 1000, which will also be announced today. Customers who have their systems serviced by another party are not eligible.

Phasing out

The revamped Series 1000 will be offered at lower prices than the original Series 1000, which will be phased out with this week's introduction.

The entry price to the product line is now $40,000 instead of $60,000. Previously, a customer could support up to 128 users at a cost of $200,000. With the Series 1000, customers can support up to 256 users for $173,000.

The revamped Series 1000 uses the same processor — the Motorola, Inc. 68020 — and operating system, an implementation of AT&T's Unix System V, as the old Series 1000 used.

TI has not had as high a profile in the mid-range market as some of its competitors because it relies almost exclusively on value-added resellers. The company, which began selling proprietary systems in the 1970s, introduced its first Unix-based systems three years ago.

Earlier systems are based on the Intel Corp. 80286 and 80386 microprocessors.

The four models are scheduled for shipment in the fourth quarter.

For users, SX spells success

BY ALAN J. RYAN
and JULIE PITTA
CW STAFF

HOUSTON — Three months after the debut of Intel Corp.'s 80386SX chip set, Compaq Computer Corp. and NEC Information Systems, Inc. are the only personal computer vendors to introduce systems based on the hybrid microprocessor. However, industry watchers predict that others will soon follow and that SX-based PCs will eventually displace their 80286 predecessors.

Early users of Compaq's Deskpro 386S — unveiled in June, coinciding with the announcement of the SX microprocessor — said they have been pleased with its performance. Compaq officials said the introduction is the most successful in the company's history, although they declined to offer shipment figures.

With the recent entry of NEC, interest in the new class of 386 appears to be growing. A number of users said they are testing the systems as a possible alternative to the 286. Luring them is the PC's ability to run 386-based applications software at a price competitive with high-performance 286 systems.

"The price is not much more than the Deskpro 286, and you gain more functionality," said Janet Zickert, division manager of professional computing services at Continental Bank in Chicago. Continental Bank has purchased about 200 Deskpro 386S systems, using them to replace IBM 3270 terminals at the bank. That project was begun last year with the Deskpro 286.

Zickert jumped to the Deskpro 386S because of its ability to run 386-based applications software.

The 80386SX is a 32-bit microprocessor that allows it to run 386-based software packages. However, it uses a 16-bit external data bus — like its predecessor the 286 — rendering it less expensive than the average 386 because it requires fewer components as well as less board space.

Industry observers have said that systems based on the 386SX may eventually cost less than $2,500.

Creates bottleneck

However, the system does have its drawbacks. The 16-bit external data bus acts as a bottleneck to performance. A 386-based package will run slower on an 386SX-based system than a traditional 386 system.

Zickert said she will avoid purchasing the 386SX systems for users who need maximum processing speeds. However, in tests of the 386S, it runs faster than the high-performance Deskpro 286, she maintained.

Michael Bryant, senior tax manager at Peat, Marwick, Main & Co., has also purchased Deskpro 386S systems to replace 286-based systems. "It's certainly a bargain," he said.

Cheryl Currid, manager of departmental computing at Coca-Cola Foods, said her company has standardized on the Compaq Deskpro 386/20. However, she said she expects to purchase some Deskpro 386S systems for less demanding applications.

"I think the 386S is preferable to any 286 if one were to be considering buying a high-end 286," Currid said. "We've put it on my vice-president's desk and he is very pleased with it. It was a nice benefit to put a less expensive machine there and give the 20-MHz system to a power user."

Tandem plans to offer Mac with Nonstop tie

BY J. A. SAVAGE
CW STAFF

CUPERTINO, Calif. — Tandem Computers, Inc. expects to offer Apple Computer, Inc.'s Macintosh workstations that connect to its line of Nonstop on-line transaction processing machines by early next year. Tandem did not say how users who already have Macintoshes and want Tandem connectivity will upgrade.

Tandem and Apple agreed last week to allow the former company to sell, support and service the Macintosh. Currently, Tandem offers PSX workstations with Microsoft Corp. MS-DOS operating systems. Unlike the PSXs, which are manufactured by Wyse Technology, Inc., the Macs will retain the Macintosh label.

"We will have a variety of LANs and connectivity products," said Rich Mironov, Tandem's Macintosh product manager. He said that currently the only way a Mac could talk to one of Tandem's computers is in a dial-up mode or through asynchronous point-to-point connections.

He said that Tandem will modify both hardware and software in the Mac to allow for transparent connectivity.

Users who have Macintoshes and want the connectivity to Tandem may be able to trade in or upgrade their workstations, but Tandem has no definite plans, according to Mironov.

Mironov would not say whether Tandem has similar plans in the works for other companies' workstations, such as Unix-based models from Sun Microsystems, Inc.

Systems education that really works!

At last: Hands-on systems education courses that confer *real* comprehension, *real* competence, in all 370 system architectures.

Completion of any course lets your people begin applying what they've learned immediately. So you'll see a greater level of self-sufficiency, as well as increased productivity.

Just a few of the courses available right now include:

Visit our booth at INFO '88 in New York City and the Federal Computer Conference in Washington, D.C.

amdahl

JCL/OS Utilities	*10/24/88* Columbia (MD)
MVS System Fundamentals Workshop	*10/24/88* Houston *11/7/88* Chicago
DB2 System Programming Workshop	*10/24/88* Santa Clara (CA)
JES2 Customization Workshop	*10/24/88* Santa Clara (CA)
VM Teleprocessing	*10/25/88* Chicago
VM/CMS Workshop	*10/31/88* Columbia (MD) *11/28/88* Chicago
Assembler Workshop	*10/31/88* Houston
VSAM Workshop	*11/28/88* Houston
CMS Structure & Flow	*11/1/88* Columbia (MD)
SMP/E Maintenance Workshop	*11/7/88* Chicago *11/14/88* Orange (CA)
DB2 System Fundamentals	*11/7/88* Columbia (MD)
MVS ICF Catalogs	*11/14/88* Boston
VM System Fundamentals Workshop	*11/14/88* Chicago
Network Tuning Workshop	*11/14/88* Columbia (MD)
MVS Supervisor & Data Management Workshop	*11/14/88* Houston
MVS Installation Workshop	*11/28/88* New York City
PROFS Installation and Implementation	*11/29/88* Santa Clara (CA)

Enroll now and put *us* to the test. Call **1-800-233-9521 ext. 63.** Or, for a complete course listing, call for a free copy of our 1989 catalog.

amdahl
The SMART Choice

ALCATEL CORTELCO*
Manufacturer of Telephones
and Key Systems

FRIDEN ALCATEL
Postage Meters, Mailing and
Shipping Systems

ALCATEL INFORMATION SYSTEMS**
Courier 3270-Compatible Computer Systems
and XTRA Microcomputer Systems

*Formerly Apparatus Division of ITT Telecommunications.

**Formerly Alcatel Courier and Alcatel XTRA Business Systems.

ALCATEL IS COMPUTERS

In fact, Alcatel is a synergy of leading companies working together to offer the systems and services your business needs to compete, prosper and grow.

Such companies as Alcatel Information Systems and Alcatel SERVCOM.

Alcatel Information Systems offers you an extensive line of powerful connectivity solutions for the intelligent workstation environment. Solutions that take into consideration the flexibility you want and the expandability you'll need as your business grows.

For high-performance productivity throughout the 3270 data network, Alcatel Information Systems offers the Courier line of communication controllers, multi-function displays and printers.

Easy access to information networks is realized through the Courier line of micro-to-mainframe links and connectivity products. In fact, the Courier Intelligent Workstation family is the first line of desktop workstations to combine advanced IBM 3270 functionality, local area network connectivity, DEC VT220 compatibility and microcomputing power in a single unit solution.

The Alcatel XTRA product family of next-generation microcomputer systems addresses the needs of virtually any business environment. The XTRA/Professional Series supports single-user high-performance workstation applications, while the XTRA/Multiple-User Series provides power for multiuser, multi-tasking systems with products such as the XTRA/386 XL.

And all Alcatel Information Systems products are serviced by Alcatel SERVCOM, one of the leading independent computer service companies with over 160 service locations nationwide.

So take a close look at the integrated computer solutions Alcatel has to offer. When you do, it will be easy to see how we can improve the way your business does business.

ALCATEL

For more information on the Alcatel companies,
call 1-800-556-1234 (ext. 247) or in California 1-800-441-2345 (ext. 247);
or write Alcatel Business Systems, 1623 Buckeye Drive, Milpitas, CA 95035.

ALCATEL PABX SYSTEMS***
Advanced PABX and Key Systems

ALCATEL SERVCOM
Computer Maintenance and Support Services

ALCATEL CABLE SYSTEMS GROUP
Optical Fiber and Cable Systems

ALCATEL NETWORK SYSTEMS/TRANSCOM
Transmission and Switching Products

***Formerly ITT Business Communications Corporation and Thomson CSF Operations.

EDITORIAL

Whatever it takes

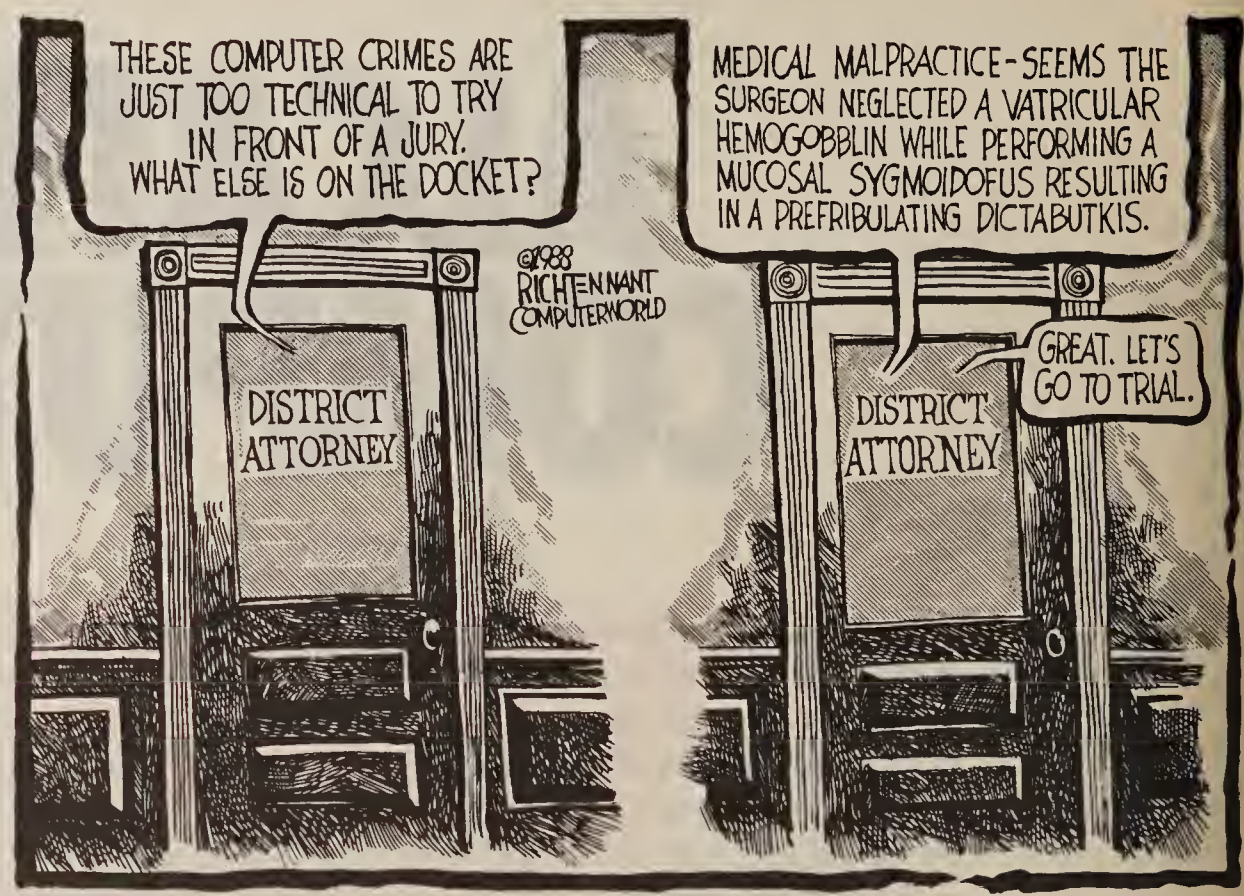
SLOWLY BUT SURELY, the computer industry is shedding its "not invented here" syndrome. The headlines last week provided further evidence. IBM, acceding to customer pressure, made Open Systems Interconnect a member of its exclusive Systems Application Architecture club. General Motors and Boeing announced they would yield active leadership of the Manufacturing Automation Protocol/Technical and Office Protocol standards drive to a consortium of user firms. And AT&T dropped another hint that it is about to give up its effort to own Unix System V and cast its lot with the Open Software Foundation.

The theme of all this activity was summed up by IBM Vice-President William O. Grabe, who said IBM is prepared to do "whatever it takes" to give customers multivendor connectivity. That is quite a change for the company that only two years ago was regarded as the gatekeeper of proprietary architectures. What a refreshing concept — that users can overwhelm vendor resistance and force the move toward openness.

The list goes on. DEC, no fan of Unix, has maintained a steady enhancement schedule for its Ultrix operating system under the crush of customer demand. Users also forced DEC to reluctantly support the MAP standard. IBM once refused to even acknowledge Unix's existence; today, it purports to be its biggest fan. The rush by database software vendors to the SQL standard was as rapid as any this industry has seen in a long time, despite the hemorrhaging some suffered by shedding their proprietary products. Even the fragmented computer-aided software engineering industry has imposed enough discipline on itself to launch a standards effort before things begin to get out of hand.

Users should take this trend as a compliment. It was not that long ago that vendors peddled their own home-brewed approaches to office automation, manufacturing, local-area networking and the like. Buyers collected incompatible computers like baseball cards. It is not unusual to find sites today running systems from eight or 10 different manufacturers, each chugging away in blissful isolation.

Technology has solved part of that problem; faster CPUs have made it less important for value to be added in specially tuned operating systems. Packaged software has forced the market to narrow its options for operating platforms. But users have been the real driving force behind the accelerating standards effort. No longer content to be stuck with white-elephant machines, they are increasingly telling their vendors to get compatible or get out. The pressure may drive some vendors to the financial brink: Wang, Data General, Apollo Computer, Cullinet and Computer Corporation of America are just a few that have buckled under the standards onslaught. But we hope the result of this cleansing process will be a heightened awareness by vendors that standards should be a precondition, not an afterthought, and that what the buyers think really does count.



LETTERS TO THE EDITOR

Check 'em out

While James Alterbaum deals effectively with the problems of source-code escrow in case of vendor bankruptcy [CW, Aug. 15], I believe the real issue remains unidentified. Purchasers should not be expected to wait for a declaration of bankruptcy to protect the vital operations embodied in software. User suffering will probably begin many months or years earlier as vendor performance declines. Unanswered telephone calls and meetings frequently canceled at the last minute may be signs of serious business turmoil.

If a software purchaser and licensee cannot get source code within the terms of the negotiated contract, an escrow based on bankruptcy is not an adequate alternative. The agreement should specify performance-related factors to determine whether the vendor is effectively in business, such as response times to communications, which can be verified empirically. I have seen users tortured by anarchic vendor behavior that did not meet legal definitions of business dissolution or termination.

Alan Gotthelf
Seidman & Seidman
New York

Red herring

All the moralizing and handwringing in the world won't do any good unless those who are responsible for the security of computer systems and the data that resides on them take adequate precautions to ensure their integrity. I refer to your editorial "Playing with fire" [CW, Aug. 15] on hackers, the page 1 article on viruses and related articles that have appeared during the past few months.

I am concerned that your stories about hackers, who are just talented amateurs, are distracting attention from professional criminals whose exploits may not be as well known but whose threat is much greater.

Anyone who merely keeps his system hacker-proof has been lulled into a false sense of security.

Philip B. Wettersten
Chillicothe, Ohio

Really at fault

If you examine the record of the prosecution of security crimes and/or the investigation of these crimes, you will find that the prosecutors are the primary reason the malefactors are not held responsible. Most (if not all) chief prosecutors have no idea how to develop and present a case involving computers, and there is no glamour in prosecuting a computer criminal.

Prosecutors are a special breed of lawyers, and I doubt that there is any one group less interested in hardware and arcane software concepts.

Those most responsible for the greatest theft of constitutional rights ever perpetrated on Americans — the loss of everyone's constitutional right to privacy — are the programmers, systems analysts and information systems managers. This great thievery is accomplished by the overwhelming invasion of privacy that information systems managers and computer guardians in general are fostering.

Governments and private industry cannot steal our constitutional rights if the computer specialists will not let them. Why do we allow anyone to sell computer-generated mailing lists with complex personal identification attached? Why haven't we in the professional ranks of computer guardians refused to cooperate when some credit bureau massages its files and produces a personal buying history for sale to the highest bidder? Where are we when state motor vehicle bureaus provide detailed personal information to any bidder?

Leroy A. Brown
New York

Question of honor

You disappoint true "hackers" with your corruption of the use of the word [CW, Aug. 15]. Time was when hacker was an honorable title given to those who hack at their systems in quest of perfection. A more descriptive word for the criminal you mention is "cracker," meaning one who breaks into the systems. "Computer enthusiast" or similar euphemisms are hardly as elegant or concise a description of these gifted people.

Richard E. Szabo
Mayfield Heights, Ohio

A novel solution

In regard to your editorial "Playing with fire" [CW, Aug. 15], I also hate intruders . . . and viruses. Why not plant a virus that only infects intruders?

Ron Willis
Hughes Aircraft Co.
Fullerton, Calif.

Computerworld *welcomes comments from its readers. Letters may be edited for brevity and clarity and should be addressed to Bill Laberis, Editor,* Computerworld, *P.O. Box 9171, 375 Cochituate Road, Framingham, Mass. 01701.*

Teaching us old dogs ain't easy

MICHAEL COHN

Thursday, 8:20 a.m.
I can think of just two reasons why I could be out of the office and be sorry about it.

Getting a cavity filled by a much-too-recent graduate of dental school is one of them.

Enduring one more of these high-tech training classes is the other.

All this corporate education has taught me one thing — always arrive at your destination early so you don't have to sit in the front row.

8:42 a.m.
"Good morning! Glad you could make it. If you haven't already done so, I'd like you to please print your names on the tent cards in front of you. . . ."

Boy, am I glad to have these tent cards. How else would I be able to find my seat when I come back from lunch?

Or is this just in case the chief executive officer bursts into the classroom and has to find me right away?

Why, I think I'll just take this tent card with me when class is over and put it on my office desk.

8:50 a.m.
"Before we get started, let's take a few minutes to go around the room and have everyone say a little bit about . . ."

Someday, I'm going to write down a hilarious, but inspiring, three-line descriptive phrase on what I do, why I am in this class and why I really wish I had gone into the tile business with my brother.

But for now, I'll have to wing it. If I go last, I won't hear anyone else's little speech because I'll be frantically trying to think of what to say. If I go first, I won't hear anyone else's speech because I'll be too busy trying to figure out if I sounded like an idiot.

11:18 a.m.
"Heavens. I barely noticed the time. Should I go on, or would you folks like to take our first little break?"

By now, those first two cups of coffee have worked their way into the same part of everyone's anatomy.

3:20 p.m.
"Let's carefully go over the charts on pages 210 through 269."

I am now extremely familiar with several members of this class.

There is the Authority. She knows twice as much about this subject as does the instructor, and she has not been too intent on keeping this a secret.

She has corrected the instructor a dozen times since lunch. Coincidentally, she is the only person in the front row.

In close competition with the Authority is the Asker. He somehow has maintained an impressive rate of about six questions per hour. "What does this acronym mean?" "Will this work during an eclipse?" "Will you explain that again, so I can act like I understand it?"

In the meantime, the room has finally cooled down to a more bearable 105 degrees Fahrenheit. The Sleeper across the aisle is face down on the handouts — probably on the page we went over two hours ago.

5:38 p.m.
"I guess this is a good stopping point. Let's all stay an extra 45 minutes and finish the exercise in the back of the book. We'll start again tomorrow at 8:30 a.m."

There is a high-tech expression that loosely translates, "Last one out of the classroom is a rotten egg."

Friday, 8:45 a.m.
"I know how tough traffic can be around here, so let's just wait a few extra minutes before we start."

Despite Thursday's nonstop action and excitement, attrition knocked the class of 26 down to a cast of 8. The Authority is a no-show, and the Asker now sits quietly in his seat. The Sleeper is here, too, but I think he just stayed over from the night before.

11:30 a.m.
"Let's take lunch now, but plan to be back promptly at 3:00 p.m."

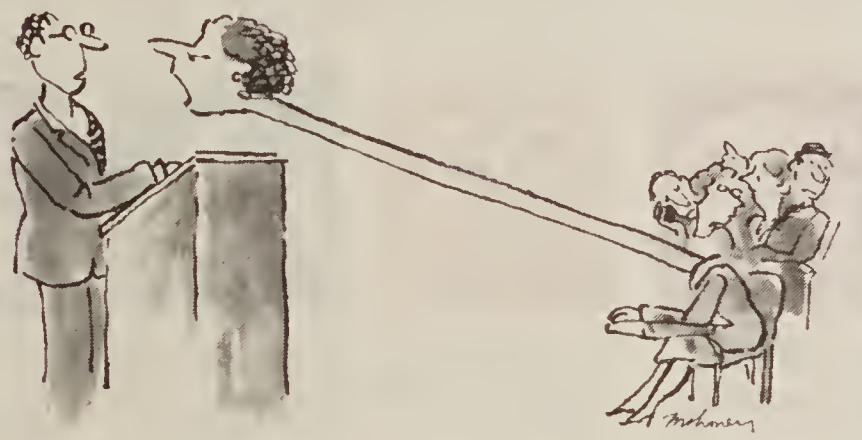
Why do I have this feeling that the instructor is running out of material?

3:20 p.m.
"Well, if there are no further questions, please fill out your class evaluations and leave them up front. My manager really relies on your feedback for my appraisal."

I pause for a moment. Should I say what I really think? Should I tear the course apart? For some strange reason, the instructor is putting up an overhead of his pregnant wife and his six kids.

Maybe next time. Why fight the system?

I race through the forms. I grab my manuals and sprint for the exit. I am the last one out the door.



JOHN MAHONEY

Cohn is a quality assurance representative based in Atlanta.

The single-vendor rule nears the end of its reign

AMY WOHL

For once, customers and vendors agree. The trend is clearly steering away from single-vendor, monolithic systems and strongly leaning toward more flexible, user-acceptable, multivendor systems.

Multivendor systems are generally a good idea. Advantages can include the following:

- Optimizing each work group's equipment to that group's needs. Financial analysts get big, networked personal computers with lots of communications for data access and memory and processors for large-scale manipulations; engineers get engineering workstations, optimized around graphics and numeric calculations. Vendors and processors are selected for their talents and capabilities in areas like transaction processing, manufacturing and office automation.
- Preserving local autonomy. Each group can make its own local decisions, within fairly broad guidelines that permit data exchange and communication.
- Preserving previous investments. You don't have to throw out what you bought before but rather create an ongoing coexistence plan.

Other side of the story

On the other hand, multivendor systems have some clear disadvantages that are often overlooked in the rush toward systems integration, because the positives can be so organizationally and politically attractive.

- Vendors often work the hardest on the products they can sell at premium prices under their own strategies. When you insist on integration across multiple vendors' products — and strategies — you often end up with lowest common-denominator computing.

To be fair, the vendor does not set out to say, "If you won't play ball properly, I'll keep the best for those who will." Exciting computing may just require more knowledge and control of the computing environment than can readily occur in today's multivendor integration schemes. It makes sense that each vendor would work out challenging problems first in its own familiar environment and then only later — if at all — in multivendor environments that include its products.

- In the old days, when your IBM system broke, you called IBM. And when your DEC machine broke, you called DEC. Today, IBM, Compaq and IBM clones may be attached to several different networks — with different types of network servers in each work group — linked via local and remote networks to a variety of minicomputers and larger hosts.

With the advent of second-generation operating systems and widespread proliferation of Apple Macintoshes in the corporate setting, figuring out what broke is a major problem. (Is it a workstation problem, a communication problem, a host problem? Is it hardware or software or both?) Complex problems that involve the interaction of multiple vendors' products are the hardest problems of all.

- Problem resolution in a multivendor environment requires that someone act as the systems integrator. Until recently, for all but very large accounts — typically federal government agencies and a few very large commercial companies — this system integrator was, by default, the user organization and its information systems department.

This arrangement seems about to change. In the last few weeks, both DEC and IBM have made statements, as part of their ongoing communication announcements, that the customer may choose to have either vendor service its own products along with specified products from other vendors.

Vendors have always done some systems integration and ongoing maintenance for a few — usually very large — customers. But few vendors have previously volunteered much information about such programs. They were often considered low- or no-profit situations that had to be accepted in order to keep a substantial customer relationship.

Today, providing multivendor systems integration looks like an excellent business opportunity. In this emerging market, a variety of companies, new and old, will try to make a big business opportunity.

The traditional systems integrators will continue to expand their interests by servicing commercial and government accounts and finding ways to profitably service smaller customers.

Competitive pressures will force all computer vendors to provide systems integration as a service. Properly handled, this work can be a real revenue contributor. But vendors need to remember that when they're selling a service, buyers expect high standards in knowledge and performance.

For vendors that have isolated themselves from integrating competitive products, it could be some time before their field staff is fully prepared to provide knowledgeable integration, support and service.

New companies, built around the notion of providing systems integration as their major service, will enter the marketplace.

All of these providers, and the user organization as the systems integrator itself, will be greatly assisted in this process by the increasing acceptance and implementation of international standards for communications and data structures.

You can't have it all

No vendor is going to agree to support and integrate all the other products in the marketplace. Each vendor will selectively support those products it sees as key allies: those that are required to be competitive and those that important customers demand.

Today, users can expect and demand much more support and cooperation in designing, implementing, maintaining and enhancing systems. The old days of the one-vendor system are probably gone forever, and few of us would wish them back.

Wohl is president of Wohl Associates in Bala Cynwyd, Pa., and editor of "The Wohl Report on End-User Computing" newsletter.

Our seminar shows you how the power of INGRES puts information at your fingertips

Only INGRES Relational DBMS and 4GL give you the solutions you want on the computers you use

If you're in charge of MIS, or are involved in the evaluation and selection of a data-base system, here is your opportunity to learn about the most advanced integrated Relational DBMS and 4GL ever.

In just a few hours, you'll know more about how to evaluate today's systems than you ever knew before. Because, after that, you'll be comparing all other systems to INGRES's Total Performance Architecture.™

Total Performance Architecture (TPA) combines Tools, Power, and Access for applications development, transaction processing, and seamless information access. INGRES can be implemented transparently across over 40 hardware and operating system platforms including DEC, IBM, and UNIX, from mainframes to PCs.

TOOLS

Minimize backlog and cost with 4GL Application Development Tools.

INGRES's powerful 4GL tools help a major consumer products company save on applications development costs. INGRES has the only full-function 4GL tools which are tightly integrated with our SQL RDBMS and are instantly portable across PC, UNIX, VAX, and IBM platforms. INGRES visual programming methods facilitate rapid prototyping and modification.

Access information faster and easier with INGRES Query and Reporting Tools.

INGRES Query and Reporting Tools are used by a telecommunications company. INGRES reduces the learning curve with easy-to-learn, "fill-in-the-form" interfaces which allow direct access to critical information. INGRES SQL also interfaces with popular programs like Lotus 1-2-3, so users can leverage existing knowledge to become productive right away.

POWER

Support OLTP applications with the INGRES Multi-Server™ Data Manager.

The INGRES Multi-Server Data Manager is the only Relational DBMS to provide scalable OLTP performance across single, clustered, multi-processor, or networked CPU configurations. With its unique AI-based Query Optimizer, INGRES helps one of the world's leading business and consumer electronics companies vastly improve overall system performance.

ACCESS

Apply INGRES RDBMS power to older file management systems with INGRES Gateways.

INGRES Gateways give a pharmaceutical company direct access to data trapped in an older file system and the ability to combine that data into new relational applications. INGRES Gateways allow access to data across different file formats (such as dBASE III and RMS). No other relational database offers these instant links to older data files.

Integrate islands of information into a distributed resource with INGRES/STAR.

Using INGRES/STAR, an international financial giant links information systems in the United States, Europe, and Japan. INGRES/STAR provides the most advanced distributed database management system available today and improves access while reducing complexity and costs for hundreds of applications from the shop floor to the board room.

Through technical presentations, case-studies, and live demonstrations, you'll see how the features of each INGRES product meet the challenges of today's MIS department from applications design and prototyping through implementation and maintenance.

We'll present specific case-studies showing how INGRES has served the needs of thousands of companies worldwide by improving development productivity by a factor of five, reducing life cycle maintenance costs, and providing true applications portability.

So, if you're a decision-maker involved in evaluating and selecting database systems, come and see why Fortune 500 companies worldwide are using INGRES to meet their MIS needs.

U.S. SEMINARS

AZ
Tucson . . . . Nov. 10
CA
Los Angeles . . . . . Oct. 27
Sacramento . . . . . Oct. 27
San Diego . . . . Nov. 10
San Francisco . . . Oct. 13
San Jose . . . . . Oct. 19
Universal City . . . . . Nov. 9

CO
Denver . . . . . Oct. 18
CT
Hartford . . . . . Nov. 10
DC
Washington . . . . . Oct. 13
GA
Atlanta: Connectivity Symposium . . . . . Nov. 2

HI
Honolulu . . . . . Oct. 20
IL
Champaign . . . . . Oct. 19
Chicago . . . . . Nov. 3
IN
Indianapolis . . . . . Nov. 9
MA
Cambridge . . . . . Oct. 25

ME
Portland . . . . . Nov. 3
MI
Grand Rapids . . . . . Oct. 20
MN
Minneapolis . . . . . Nov. 1
NJ
Saddle Brook . . . . Nov. 29
NM
Albuquerque . . . . . Nov. 8

NV
Las Vegas . . . . . Oct. 19
NY
Rochester . . . . . Nov. 29
OH
Cleveland . . . . . Nov. 10
OK
Oklahoma City . . . . Oct. 12
OR
Portland . . . . . Nov. 1

PA
Pittsburgh . . . . . Nov. 9
TX
Dallas . . . . . Oct. 26
San Antonio . . . . . Oct. 19
VA
Norfolk . . . . . Nov. 2
WA
Seattle . . . . . Nov. 8

CANADIAN SEMINARS

BC
Vancouver . . . . . Oct. 26
MAN
Winnipeg . . . . . Nov. 9

ONT
Ottawa . . . . . Nov. 1
Toronto . . . . . Oct. 25

To register, call toll-free (in the U.S. and Canada):

1-800-4-INGRES
(1-800-446-4737)

ASEM840CW

INGRES
RELATIONAL TECHNOLOGY
1080 Marina Village Parkway, Alameda, CA 94501

© Relational Technology. Registered trademarks: IBM (International Business Machines Corporation), VAX, RMS (Digital Equipment Corporation), UNIX (AT&T), LOTUS 1-2-3 (Lotus Development Corporation), dBase III (Ashton-Tate Corporation). INGRES Total Performance Architecture, INGRES Multi-Server are trademarks of Relational Technology. Printed in U.S.A.

HARD TALK

Jean S. Bozman

Doing the old end run

In the old days, when IBM mainframes couldn't talk to Honeywell mainframes or NCR mainframes, there was always the old end run to data compatibility. You simply grabbed a reel of data tape off one computer, walked it down the hall and placed it onto the second computer's tape drive.

But those were the old days, right? Today, we have an alphabet soup of compatibility facilities, including Manufacturing Automation Protocol, Technical Office Protocol and Open Systems Interconnect, that make computers talk to each other. Right?

Not exactly. The economics of long-distance communications over leased lines still make it cheaper for many organizations to express-mail data tapes to each other overnight. And some MIS shops still subscribe to the philosophy of "Sneakernet" — namely, that it is still cheaper to get some kid to walk a data tape down the hall or even to bike it across town. With this in mind, I was pleased to note two September news announcements that prove the old data-tape end run is still alive and well.

First, Memorex Telex in Tulsa, Okla., announced an IBM 3480-compatible tape cartridge drive that can be attached to IBM System/38 and Application System/400 machines. The Memorex 5461 tape subsys-

Continued on page 34

Awaiting more VM/XA function

Users say IBM reacted to input, designed second release to please critics

BY STANLEY GIBSON
CW STAFF

A first taste of IBM XA computing has left VM users with a taste for more and the hope that future releases will go down a bit smoother.

While VM/XA System Product 1 has opened new horizons for users, its problems have prevented it from being generally released. And it apparently will not attain that status before being superseded by VM/XA SP 2, which IBM is indicating to users will ship on time in December.

An IBM spokeswoman said last week the operating system continues to ship in phases, and it has not been determined when it will become generally available. IBM still plans to make Release 2 generally available by year's end, she added.

"IBM has said VM/XA SP 2 is on track and has not been affected," said Gabe Goldberg of IBM's VM Systems Group. Problems with the CMS component of VM/XA SP 1 have caused IBM to withold the release to users with "CMS-intensive" requirements [CW, Aug. 1].

The CMS component would provide the interactive environment to support large numbers of users. "What worked with 100 to 200 users under VM did not work with 1,000 to 2,000 users," Goldberg said.

VM/XA SP 1 was announced in June 1987 with a scheduled general availability date of March 1988. IBM missed that deadline and began shipping the operating system to selected customers at the end of April.

Although it failed to deliver a high-end interactive operating system when it said it would, IBM was praised by Goldberg and others for protecting users from a bug-ridden release.

"It was good that they did that, because users would have had problems," said Peter Kronenburg, a VM systems programmer at Information Builders, Inc. in New York. Information Builders is using VM/XA SP 1 on an IBM 4381 Model 14, primarily for development. Similarly, VM Systems Group is not a CMS-intensive user but runs VM/XA SP 1 on an IBM 4281 used mainly for development work.

Another user gripe has been the omission of ASCII support in the VM/XA SP 1. "It's a little mind-boggling that it slipped their minds," Goldberg said.

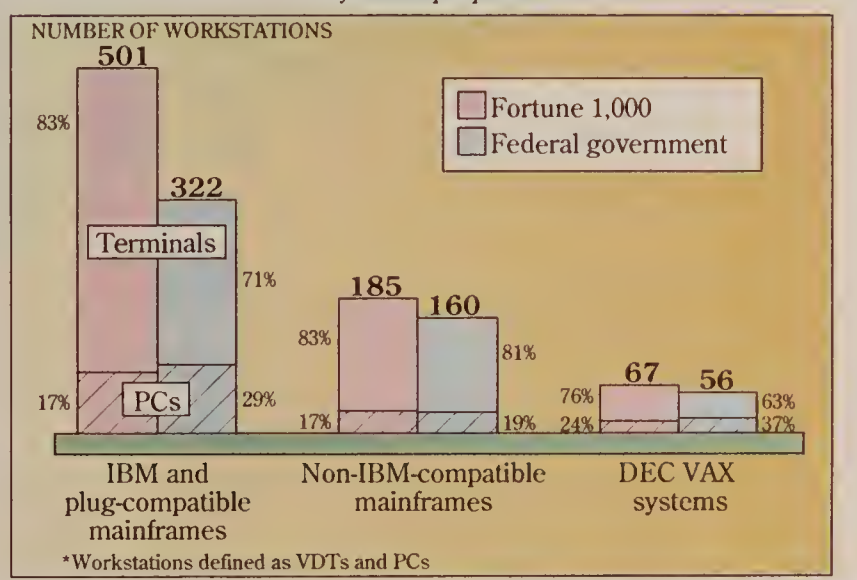
Romney White, vice-president of Velocity Software, Inc. in Boston, pointed out that IBM had offered ASCII support under VM since 1973 and that the

Continued on page 30

Data View

Civilian vs. federal workstations

Fortune 1,000 sites use more workstations than the federal government does, and they use a smaller percentage of the PCs for that purpose*



SOURCE: COMPUTER INTELLIGENCE
CW CHART

Librarian in VSE upgrade

BY AMY CORTESE
CW STAFF

Applied Data Research, Inc. (ADR) last week released a new version of Librarian that brings change control and management capabilities to its DOS/VSE customers.

The announcement comes less than two weeks after the Princeton, N.J.-based company announced it would be acquired by Computer Associates International, Inc. According to sources at ADR, however, the Librarian rollout was unaffected by the changes at ADR.

Continued on page 30

New game for service industry

BY ROSEMARY HAMILTON
CW STAFF

Service and maintenance providers today are faced with a choice: Come up with new and innovative services for users or say good-bye.

So claims the Ledgeway Group, Inc., a research firm based in Lexington, Mass. The company recently completed its third annual report on the service and maintenance market and claims that because traditional hardware maintenance sales are tapering off, providers are being forced to devise new offerings to bring in the bucks.

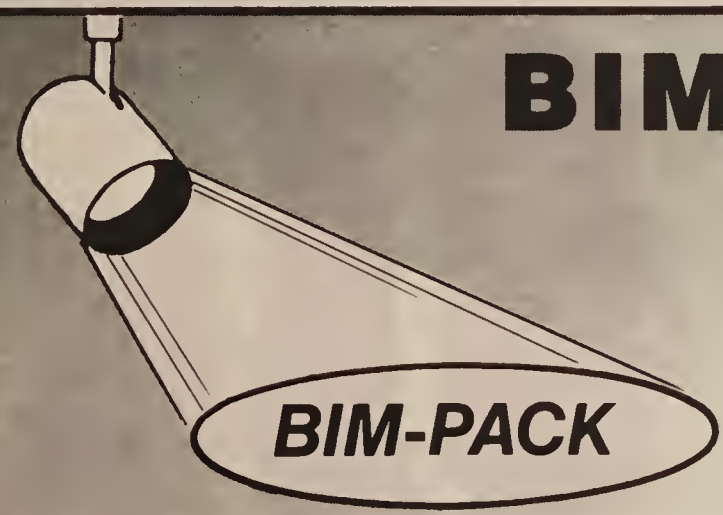
The Ledgeway Group said it expects that in five years this market will look completely different from how it does today. As hardware becomes more reliable, it requires less on-site care. As a result, by the early 1990s, the successful service providers will offer such services as software maintenance and consulting in areas like system design and network management, the research firm reported.

The companies will continue to offer hardware maintenance, the group reported, but it will become an increasingly

Continued on page 31

Inside

- What installing an AS/400 feels like. Page 29.
- Unisys offers MSA financial solutions. Page 29.
- Mexican bank picks up Internet system. Page 29.
- Iverson offers tape-drive sharing. Page 35.



BIM Spotlight

PROBLEM: *No end in sight to the growing need for more DASD storage space*

SOLUTION: *BIM-PACK–DOS/VSE Automatic VSAM File Compression*

BIM-PACK addresses one of the major problems of todays computer installations—Disk Storage. With the ever increasing demand to keep more data on-line, computer installations are faced with the need to continually install more disk storage devices. BIM-PACK addresses this problem for ENTRY and KEY-SEQUENCED VSAM files by allowing for the compression of data on selected files. File compression from 35% to 70% is typical. Additional benefits of using BIM-PACK are reduced disk I/O and channel activity.

Call for full documentation or free 30-day trial.

Price: $6400, $3200/yr, or $320/mo.

BIM has over 20 system software products for improving productivity and use of DOS/VSE, OS, and CICS, and also performs systems programming consulting. Marketing agents in most countries.

BIM

B I MOYLE ASSOCIATES, INC.
5788 Lincoln Drive
Minneapolis, MN 55436

612-933-2885
Telex 297 893 (BIM UR)
Member Independent Computer Consultants Assn

Bank managers spend less than 25% of their time seeking new business.

UN

© 1988 UNISYS CORP.
FSA Finesse is a trademark of Unisys Corporation

To increase your market share, it's more important than ever to make every minute of selling time more profitable. For managers as well as customer service representatives and tellers. But according to a recent study, bank managers just don't have the time.

With the Unisys FSA Finesse™ branch automation system, you can change that. You'll handle more customers in less time, do more cross-selling and build better customer relationships.

FSA Finesse can put current, complete customer profiles online with product descriptions (including selling prompts), onscreen forms, and a spreadsheet.

So you and your people can work with customers to select the right products, spot cross-selling opportunities, and close deals. Quickly.

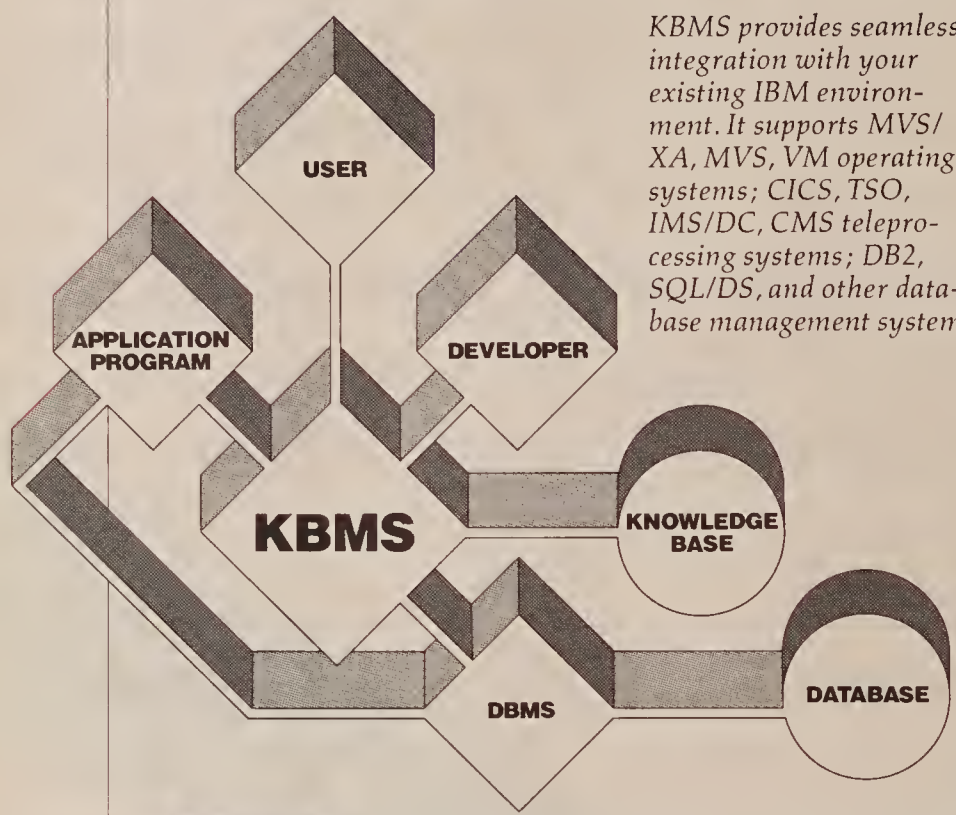
You can also use FSA Finesse to market new products your competition can't match. As well as track product —and personnel— performance.

Better information leads to better decisions. And it's a smart decision to invest in FSA Finesse, a system that gives your people the information they need to capture more new business. BETTER INFORMATION. BETTER DECISIONS.

iSYS

The power of ²

INTRODUCING KBMS®, THE FIRST KNOWLEDGE BASE SYSTEM FOR PRODUCTION APPLICATIONS.



KBMS provides seamless integration with your existing IBM environment. It supports MVS/XA, MVS, VM operating systems; CICS, TSO, IMS/DC, CMS teleprocessing systems; DB2, SQL/DS, and other database management systems.

KBMS
KNOWLEDGE BASE MANAGEMENT SYSTEM

A major computer company is saving over $25 million a year on product ordering and configuration, thanks to expert systems they developed in-house.

A leading financial services company has substantially reduced bad credit losses with a computerized system they developed based on artificial intelligence.

These are true stories. Yet expert systems still have not taken a serious place in the business world.

Why? Because they've been available only on specialized systems using esoteric languages like LISP and PROLOG. So, like the companies described above, you could only benefit from knowledge-based systems if you had a great deal of money, people and time to make them work.

Until now.

THE PRACTICAL BREAKTHROUGH: FULL INTEGRATION WITH IBM AND DATABASE SYSTEMS.

Now AICorp has developed a knowledge base management system called KBMS that is ready to take its place – along with database management and fourth-generation languages – as a major competitive business tool.

KBMS is a mainstream software system that is an extension of conventional DP practices. It provides seamless, high-level integration with your existing applications and databases.

The system runs under major IBM operating systems, teleprocessing systems and database management systems. It can be integrated with your existing applications by calling a KBMS module from a standard COBOL program, or vice versa. It even has the speed and processing power to be used in high-volume, transaction processing applications.

Perhaps most important of all, you can implement KBMS using the experience, hardware and software investment you have in place already.

IMPLEMENT A NEW CLASS OF APPLICATIONS.

KBMS makes it possible for you to develop practical solutions for whole new applications areas – applications that are strategic and crucial to your business, but simply have been too complex to solve with traditional, procedural programming approaches.

For example, manufacturing companies can use KBMS to build an expert system for reviewing every incoming order for proper configuration. Insurance companies can use it for underwriting decisions to guarantee that corporate policy is always followed. Energy generating companies can use it to better predict energy needs. And financial organizations can use KBMS to enforce credit approval guidelines.

Any business problem that is complex, governed by many interrelated rules and policies, and subject to frequent change is a candidate for KBMS.

HOW KBMS WORKS.

KBMS, which stands for Knowledge Base Management System, incorporates the four key techniques of AI programming methodologies: goal-directed reasoning (backward chaining), data-driven reasoning (forward chaining), hypothetical reasoning, and object-oriented programming.

By combining these techniques in one integrated system, KBMS gives your business applications the full "reasoning" power of expert systems technology, allowing you to address a wide range of applications with a single product.

A FREE SEMINAR WILL SHOW YOU HOW KBMS CAN GIVE YOU A COMPETITIVE ADVANTAGE TODAY. CALL (617) 890-8400.

AICorp, a developer of AI-based mainframe applications for more than 10 years, and the creator of the INTELLECT™ natural language system, is holding a series of seminars that will show you how KBMS can provide a measurable, significant and immediate return on investment for your company.

To register for the seminar in your area, please call (617) 890-8400. AICorp, 100 Fifth Avenue, Waltham, MA 02254-9156.

AICORP

Bringing AI Software to Business

AT LAST. A PRACTICAL KNOWLEDGE BASE MANAGEMENT SYSTEM FOR YOUR IBM MAINFRAME ENVIRONMENT.

KBMS is a registered trademark and INTELLECT is a trademark of AICorp, Inc.

XEROX

Shouldn't your printer be as smart as your computer?

Xerox Intelligent Printing Systems. Printing systems

Low data center productivity. It still persists despite billions spent on data processing technology. Could the problem be smart computers lashed to not-so-smart printers?

The solution is intelligent printing systems from Xerox, leader in document processing. Unlike other printers, they have the power, the capability and the intelligence to produce complex documents from computer data without tying up your host computer in the printing process.

Xerox Intelligent Printing Systems merge text with graphics, and forms with data, to give your documents publishing house quality. Documents can be printed on multiple paper weights, colors and sizes. And Xerox Intelligent Printing Systems' recent announcement of 50 ppm 600 x 600 spi resolution means a new benchmark in electronic printing. Selected applications can now feature half tones and the smallest of type sizes as a part of day-by-day data center operation.

While your document quality can be far higher, your costs can actually be far lower. Because Xerox Intelligent Printing Systems can think and work on their own, expensive CPU resources aren't tied up in the printing process. Your organization's forms, logos and signatures are stored on the printer, eliminating preprinted stocks. Outside printing costs can be drastically reduced because Xerox Intelligent Printing Systems' document quality allows you to bring complex jobs in house.

XEROX

as smart as your information system.

Xerox Intelligent Printing Systems, like your computer, can be programmed to deliver with leading-edge efficiency. They load while running for continuous operation. Using another Xerox exclusive, magnetic ink character recognition (MICR), negotiable document production can be cut from seven steps to one.

Xerox Intelligent Printing Systems include the premium quality, high-volume 9790 and 8790 systems; solid, productive mid-volume systems like the 4050, the 4075 and the 3700 for data centers and distributed locations; and the versatile low-volume 4045 for office and terminal-network environments. There's also the newly introduced 92 ppm 4090 for the ultimate in mid-volume productivity and the 4650 with 600 x 600 spi resolution. Team Xerox professionals have already converted thousands of data centers to electronic printing—Xerox Intelligent Printing Systems are compatible with virtually every mainframe—and as a result have specific applications developed, proven and ready to put in place for you today. By installing a printer as smart as your computer, you'll not only increase printing quality, but gain a quantifiable competitive edge through superior applications documents.

Xerox Intelligent Printing Systems are a vital part of Xerox leadership in document processing. Whether creating, copying, distributing or filing, we turn ideas and information into electronic and print documents that are superior in look *and* content.

XEROX

Smart printers, smarter applications.

It's one thing to improve printing quality, another to dramatically improve your printing applications. This is what intelligence in printing is all about.

Take insurance, for example. Xerox Intelligent Printing Systems allow forms and page formatting instructions to be stored at the printer. As a result, policies can be printed without the need for preprinted forms and without costly hand assembly. With Xerox MICR printing techniques, payment checks can be printed on the claim settlement document itself at the same time! Xerox Supplies Division supplies safety papers, preperforated and die-cut stocks, labels and transparencies in addition to cut sheet paper that sets industry standards for paper quality. This level of applications productivity improvements also applies to banking, manufacturing, retailing and finance. As of today, 85% of the *Fortune 500* companies are using Xerox Intelligent Printing Systems to give their applications documents a competitive edge.

Team Xerox.
We document the world.

To have a Xerox electronic printing systems specialist show you how intelligent printing can lead to smarter applications, call us at 1-800-TEAM-XRX (1-800-832-6979), ext. 117E or send the coupon below.

Xerox Corporation, P.O. Box 24, Rochester, NY 14692

NAME/TITLE (please print)

COMPANY

ADDRESS

CITY STATE ZIP

MAGAZINE IN WHICH THIS AD APPEARED

XEROX® and the number names are trademarks of XEROX CORPORATION
8/88 610P19917

SOFT TALK

Mark Duncan

Time to shift gears

Quality assurance functions in data processing present something of a conundrum. They may easily be the most important component of MIS departments, but they are also probably the most endangered species within MIS.

They are important because they are the manifestation of MIS management's commitment to producing quality application software. And they are endangered because they are only an "assistance" function to system developers. This assistance can be heeded or ignored, depending on such influencing factors as project deadlines and the extent of management's endorsement of the need to enforce standards.

Over time, lack of acceptance of quality assurance renders it merely ornamental. For quality assurance functions suffering from this condition, it is time for action. Quality assurance must shift into a higher gear.

Thus, in addition to the traditional activities that quality assurance must undertake, there are a number of other considerations that deserve attention. They will enable quality assurance to not simply do its job but to do it effectively — possibly even to excel at it.

Keeping up

Quality assurance must do enough research and development to stay abreast of applications development in terms of tools and methodologies. It is not enough to adopt a reactive disposition and try to fit methodologies around tools that others acquire. Quality assurance must establish and aggressively promote a methodology that best fits the style of development and the environment and then recommend appropriate tools to automate that methodology.

Rubbing shoulders with staff from development centers and information centers will keep quality assurance cognizant of trends in automation and the direction in which the organization is heading. Anticipating change and planning for it with versatile methodologies will lessen the "methodology rewrite quotas" on which quality assurance typically spends much of its time.

Computer-aided software engineering technology and the programmer workbench con-

Continued on page 34

The hectic transition to the AS/400

ON SITE

BY ROSEMARY HAMILTON
CW STAFF

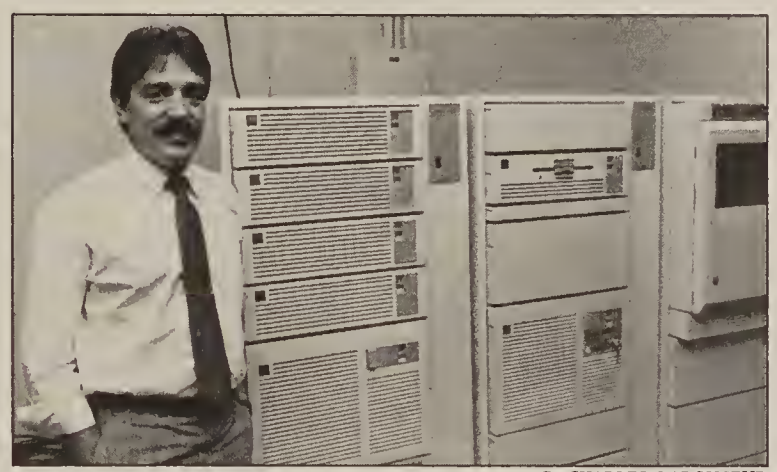
September was a month unlike any Robert Irwin had had in a long time. As corporate MIS director of C&K Components, Inc. in Newton, Mass., he oversaw the company's switch from an IBM System/38 to a new IBM Application System/400.

Irwin said the migration to the new IBM minicomputer platform had its share of expected problems as well as a few snafus that, based on what IBM told him, were not supposed to happen. But the new system is an overall success, Irwin said.

"I'm excited because it's up and running," Irwin said. "The minor setbacks — we knew we'd encounter them. It took some long hours, but it was worth it."

The AS/400 installation is the first step in an information systems plan at C&K. The company, which has five other divisions worldwide, plans to standardize on this platform and a single manufacturing resource planning (MRP) software by 1991.

But before that can happen, Irwin and his staff of 11 had to get through last month. For four weeks, the C&K MIS staff resolved a series of glitches with peripherals, prepped the software, ran tests and reran tests. On Sept. 22, they unplugged the System/38, pushed it to the back of the computer room and went live with the AS/400 Model 50.



P. CHARLES LADOUCEUR

Robert Irwin *sees eye-to-eye with the AS/400*

Irwin said there has not been a problem since.

C&K, which makes electromechanical switches used in computers and electronic devices, was one of the first customers to receive an AS/400 in late August. IBM, meeting its targeted shipment date, shipped systems to approximately 250 customers in the U.S. by summer's end.

On Aug. 24, an AS/400 Model 50 with 16M bytes of main memory and 3.2G bytes of disk stor-

Continued on page 33

Unisys touts MSA tools

BY AMY CORTESE
CW STAFF

Unisys Corp. last week announced three financial software applications from Management Science America, Inc. (MSA) as part of an agreement with the Atlanta-based software house.

The additions round out Unisys' financial product offerings for Model 1100 and 2200 and Series A and B customers, the company said.

The financial offerings include a project tracking system and purchasing system for 1100 and 2200 systems and an accounts receivable package for A series customers. The products are the latest of MSA's financial solutions to be ported to Unisys platforms.

The financial application sets from MSA available on IBM and other platforms are identical to those offered by Unisys, according to Parkash Trivedi, Unisys program manager for financial products.

With the addition of project tracking and purchasing, all the MSA financial, payroll, human resources and cash management applications are now available for the 1100 and 2200 systems.

With the announcement of accounts receivable for Series A systems, only the purchasing and project tracking are not yet available, according to the firm.

The long-standing agreement between MSA and Unisys was enhanced this spring, with Unisys increasing its marketing responsibilities.

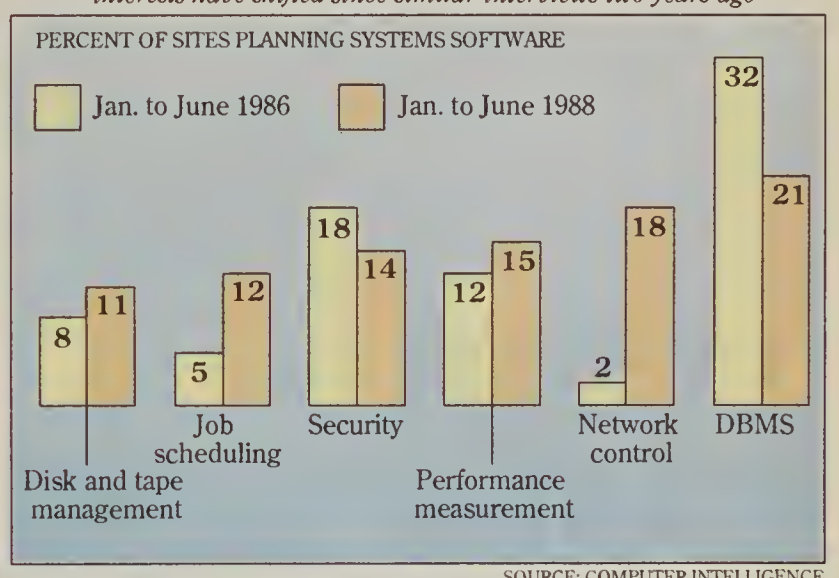
Unisys ports MSA products to Unisys environments and markets and supports the products to its customers. MSA provides the product code, documentation and education.

Under the agreement with MSA, Unisys contracted for the right to market all MSA products. Prices range from $72,000 to $110,000 for accounts receivable; from $87,000 to $132,000 for purchasing; and from $28,000 to $41,000 for project tracking.

Data View

Network control on more shopping lists

Of almost 10,000 sites surveyed between January and June, 35% are planning systems software; among sites that are planning, buyer interests have shifted since similar interviews two years ago



SOURCE: COMPUTER INTELLIGENCE
CW CHART

SOFT NOTES

Internet hawks Atlas

Internet Systems Corp. in Chicago, a supplier of international wholesale banking systems, said it sold its Atlas system to Banco Nacional de Mexico's New York and London offices.

The $2 million contract includes foreign exchange, money markets, funds transfer, commercial lending and accounting applications.

Internet also said it sold a global license for Atlas to the Royal Bank of Canada in Toronto. The bank intends to use Atlas in North America, Europe and the Far East.

XA Systems Corp. in Los Gatos, Calif., announced a marketing relationship with **The European Software Company** (TESC), headquartered in Dublin, Ireland, with offices throughout Europe. TESC, a subsidiary of **Boole and Babbage, Inc.**, will sell XA's IBM mainframe software in all major European countries.

XA's mainframe software products reduce the time programmers spend working with the complexities of files and databases, according to the vendor.

The software works with IBM MVS and MVS/XA mainframe systems.

Multi Soft, Inc. in Lawrenceville, N.J., recently signed a $3 million joint marketing agreement with **Management Science America, Inc. (MSA)** in which MSA will use two Multi Soft products, Infront and Software Distribution Facility. MSA will use the products to enhance current MSA products and develop future MSA offerings. The agreement also allows MSA to sell the two products to MSA users and others.

Sequoia Systems, Inc. said its Series 200 fault-tolerant multiprocessor has completed the Unix Standard Operating Environment (SOE) testing conducted by Bellcore. The analysis focused on Sequoia's proprietary operating system, Topix. Topix is fully compliant with AT&T's Unix System V.2 Interface Definition.

The SOE is intended to facilitate application generation by and for the Bell operating companies. An SOE will support the development of generic nonhardware-dependent applications capable of running on all machines.

MSI Data Corp. in Costa Mesa, Calif., signed multiyear agreements with **Supermation, Inc.** and **Dott Computer Systems, Inc.** for their software products. MSI will port the retail application software of the two vendors to its Portable Data Terminals line.

MSI's objective is to offer an in-store system for the grocery, drug and hardware markets with an integrated database. The database will accommodate the growing need for direct store delivery and shelf price audit, according to Ralph Thomas, MSI senior director of marketing.

Librarian

FROM PAGE 25

"That will come with later releases," said Rich Parente, product manager for Librarian.

The release, called Librarian/Change Control Facility, includes a function for managing changes during the application development process when used with ADR's on-line program development tool, Vollie.

There is a large measure of synergy between Librarian and many of CA's products, according to the companies. For instance, change-control software works hand in hand with security software. Although Librarian works with any outside security package, Parente said to expect closer ties to CA's security products in the near future.

ADR claims the new version is the first change-control product available for DOS/VSE. VSE customers contacted expressed enthusiasm about the product.

"There is just as much need for change control in VSE environments as there is with MVS," said Ross Maltman, a systems programmer at Minico, a Phoenix-based insurance company and beta site for the product.

Maltman is already running Librarian in conjunction with CA's Dynam DT resource management software.

Maltman said he does not believe that the sale of ADR will have an impact on his operations, because he does not foresee CA cleaning house. "It would be a mistake for them to consider doing so," he said, adding that CA is not familiar enough with the database and development market in which ADR operates.

Librarian Release 3.8, available now, also includes enhancements to all IBM 370 operating environments: ISPF/TSO, Roscoe, ISPF/CMS and VSE.

Current users can upgrade free of charge, according to ADR. For new users, the license fee is $25,000.

© Eastman Kodak Company, 1988

The new Kodak Optistar Autotouch finisher for the Komstar imaging system is productive proof of Kodak's continued commitment to the COM industry.

The Kodak Optistar Autotouch finisher lets you duplicate and collate fiche for optimum results with minimal operator intervention. And this new finisher's touch screen makes it uniquely easy to operate. Superb Kodak service and support, combined with advanced technology, assure high reliability and increased productivity. Compatible with current and future technologies, this important new product once again demonstrates Kodak's continued commitment to the COM industry. For more information, talk to your Kodak Business Imaging Systems representative about the Optistar Autotouch finisher, or call 1 800 445-6325, Ext. 303.

THE FINISHING TOUCH FOR COM, FROM KODAK

The new vision of Kodak

Kodak

VM/XA

FROM PAGE 25

omission was probably more than an oversight. "IBM must feel there is an alternative in protocol converters," White said.

Nonetheless, some users say that IBM has listened to user complaints and offered signs that remedial action is being taken.

"IBM has said they recognize the requirement," Goldberg said. How soon ASCII support can be expected, however, is not clear, he added.

Object-code-only

A change in maintenance tools in VM/XA SP 1 has also stirred up the user community: Maintenance fixes are now shipped in object code.

"They don't ship you source updates, so you don't have the same control over what's in your system," White said. The object code replacements have made maintenance more complex, he said. With a mix of source-code patches and object-code updates, the likelihood of inconsistencies developing between modules is higher, White said.

"Aside from the object-code-only issue, I think the tools will be a great improvement," said Phil Smith, a product developer at VM Systems Group. He said the new tools have improved the method of distributing fixes, but their unfamiliarity, poor documentation and some "spectacular bugs" have been obstacles.

Regardless of how they are greeted by users, IBM has indicated the new tools will be part of VM/XA SP 2, Smith said.

In addition to more efficient CMS performance, VM/XA SP 2 will be welcomed for the VTAM support that IBM has promised with it.

Having experienced the deficiencies of VM/XA SP 1, customers are awaiting VM/XA SP 2 as a sort of panacea, most users indicated. And IBM's hints have left them with the distinct impression that help is on the way.

Nonetheless, it would not be fair to call VM/XA SP 1 a flop, Goldberg maintained.

"SP 1 gained users and IBM experience in working with bimodal CMS. It also enabled users to get migrations to XA under way," he said. "Given what a massive transition it is to go from 370 to XA, it was not a failure, but a first step."

Service

FROM PAGE 25

smaller chunk of their business.

The Ledgeway Group surveyed service suppliers and reported that the average company claims that hardware maintenance accounted for 81% of revenue in 1987. By 1992, they expect that percentage to drop to 61%, the research firm said.

The report also stated that total revenue in this market grew to $51 billion in 1987, which shows an overall increase of 12.3% over 1986 revenue. However, when foreign currency gains are factored out, the actual percentage increase is 6%, according to Richard Vancil, director of market development at the Ledgeway Group.

That 6% change marks the third consecutive year of slowing growth, Vancil added. In 1985, the service industry grew by 13%, and in 1986, the growth was measured at 8.7%

The Ledgeway Group suggests that computer companies, as opposed to independent service firms, will be better prepared to make this switch to new offerings because they have access to more corporate dollars than independents.

"As a group, we don't think [the independents] will handle the changes well," Vancil said. "They've structured themselves for a hardware-only operation, and they don't operate with the corporate resources of systems vendors."

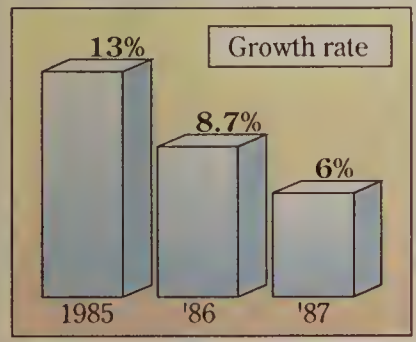
As service providers depend less on hardware maintenance, the way they do business will also change, Vancil said. The traditional technician will become a less frequent sighting as service providers rely more on remote diagnostics and service.

For such new areas as software maintenance and network problems, remote services are more suited, Vancil noted.

The type of employee is also expected to change. The traditional technician will be replaced with consultant-like technicians who will have to be knowledgeable on hardware and software issues as well as networking, multivendor environments and overall system requirements.

The service industry's changing face

Real growth in hardware and software services and support continues to decline



SOURCE: THE LEDGEWAY GROUP, INC.
CW CHART

HARD BITS

Sparc still on a roll

Sun Microsystems, Inc. is still on a roll with its Scalable Processor Architecture (Sparc). Sparc was recently selected by Prisma, Inc., a Colorado Springs company that has a gallium arsenide project underway. The company said it intends to use Sparc in a supercomputer-class system with a gallium arsenide-based processor that has been scheduled for availability late next year.

The New Hampshire State Liquor Commission picked **Nixdorf Computer Corp.** to provide point-of-sale terminals and Unix-based minicomputers. The $3.5 million deal will involve automating 75 New Hampshire state liquor stores. The stores require 230 terminals and will be supported by 77 of Nixdorf's Targon minicomputers.

A **Convex Computer Corp.** minisupercomputer has been installed at the Michelin Americas Research & Development Corp. in Greenville, S. C. The company is the research arm of the tire organization.

Michelin said it will use the Convex system for three-dimensional finite element analysis to study new tire structures and designs.

Systems software for MVS data centers:

Enter the world of total solution, total support.

Computer Associates announces an integrated, total software solution for MVS data center automation: **CA-UNICENTER®/II MVS**. It consists of the following **CA-UNIPACK™** modules:

SECURITY, CONTROL AND AUDITING (SCA)
Access control, network security, system audit.
DATA CENTER ADMINISTRATION (DCA)
Problem control, change management, inventory and financial control.
AUTOMATED PRODUCTION CONTROL (APC)
Automating: job scheduling, console operations, print management, report distribution.
STORAGE AND RESOURCE MANAGEMENT (SRM)
Tape and DASD management, sorting, disaster recovery.
PERFORMANCE MEASUREMENT AND ACCOUNTING (PMA)
Capacity planning, network management, performance measurement, resource accounting, system analysis.

CA-UNIPACKS are groups of advanced products working together to automate major functional areas of the data center. You maximize productivity when you install all CA-UNIPACKS to create CA-UNICENTER/II MVS.

Only Computer Associates has the products and expertise to provide MVS data centers with such a cost-effective, total solution.

And only Computer Associates offers **CA-UNISERVICE®/II**, a secure link between your mainframe and CA's Customer Service System 24 hours a day. You get online access to software fixes, interactive problem resolution, plus product tutorials and more!

Enter the world of total solution, total support.
Call Dana Williams today:
800-645-3003 (Ext. 1040).

COMPUTER ASSOCIATES®
Software superior by design.

• World's leading independent software company.
• Broad range of integrated business and data processing software for mainframe, mid-range and micro computers.
• Worldwide service and support network of more than 100 offices.

Resource & Operations Management • Financial • Banking • Graphics • Spreadsheets • Project Management

The Wyse WY-700 Graphics Subsystem. In desktop publishing, PC users have set high standards for themselves. Among displays, their first choice is our WY-700 high resolution monitor and video board. It's the best seller by a wide margin, for reasons that are plain to see. The WY-700's sharp 1280 x 800 pixel resolution rivals subsystems costing twice its $999 price. No one else gives you nearly as many pixels per dollar. And its 15" paper white screen presents two full, truly WYSIWYG pages in high resolution mode.

It should come as no surprise that the leader in displays is also the leader in software compatibility. As the standard, the WY-700 graphics subsystem now runs over 100 programs in high resolution mode. Including Xerox Ventura Publisher and Aldus PageMaker/PC, plus many other DTP applications. And if you do more than desktop publishing, the WY-700 supports packages like Microsoft Windows and Excel, Lotus 1-2-3, and AutoCAD.

We've just bundled a Hotshot product. Now the WY-700 comes bundled with Hotshot Grab, from Symsoft. It enables you to capture and store any text or graphics screen and transport it to another file or DTP application. For example, with a few keystrokes you can load a CAD image into your DTP document. And Hotshot Grab, a $99 value, is free with the WY-700. Now. But not forever.

Graphic images captured by Hotshot Grab.

SystemWyse™ adds even more. Wyse is the only manufacturer who makes the monitor and video board in its DTP graphics subsystem as well as a selection of 286 and 386 based PCs to drive it. That gives you a system integrated with singular harmony. And supported by a singular source.

Find out why more PC users see desktop publishing our way. Call for more information.

1-800-GET-WYSE

WYSE

We make it better, or we just don't make it.

Wyse® is a registered trademark of Wyse Technology. SystemWyse and WY-700 are trademarks of Wyse Technology. Other trademarks/owners: Ventura Publisher/Xerox; Aldus PageMaker/PC/Aldus; Hotshot Grab/Symsoft; Excel, Windows/Microsoft; Lotus 1-2-3/Lotus Development; AutoCAD/Autodesk. Screen text and graphics adapted from *The Classical Orders of Architecture*, by Robert Chitham, Rizzoli International, NY.

Transition

FROM PAGE 29

age arrived at C&K's Newton plant. But other than arriving on schedule, the system did nothing more until the Labor Day weekend had passed. The problem: a faulty IBM 2440 tape drive, which had been announced along with the AS/400. The tape drive simply did not work, which halted the MIS team's implementation schedule.

According to Irwin, C&K had received a tape drive with a dead board inside. It waited two weeks for IBM to replace the defective 2440 component. There have been no other problems with the tape drive since the board was replaced, Irwin said.

In the first week of September, the two major jobs took place. On the systems side, Irwin's staff made sure that the processor and the various devices at C&K worked together. But not all of them did.

"We've had a few compatibility problems with non-IBM devices, although we were told months ago that wouldn't be a problem," Irwin said.

> "THE COMMON thinking is that you don't want to be the pioneer with the problems. But I didn't mind that."
>
> ROBERT IRWIN
> C&K COMPONENTS

One example was a protocol converter that ran on the System/38. It took data that was captured by factory devices such as bar code readers and translated it into System/38 code. It would not work with the AS/400 and required modifications that were completed before Irwin's group went on-line.

While the systems people tackled such problems, another group readied the software — some 1.5G bytes of data. C&K had used homegrown software on the System/38, which it planned to port to the System/38 mode on the new machine. Irwin said this group expected some glitches with the homegrown software, and they were right. But Irwin said the modifications required were minimal and the migration, for which they relied on the IBM tools, went smoothly.

Looking back at September, Irwin said he would do nothing differently. His one regret is that being an early user means there are few other users to rely on as resources.

"The common thinking is that you don't want to be the pioneer with the problems," Irwin said. "But I didn't mind that."

Although the installation is behind it, the MIS department was a hectic place late last month. Boxes and terminals were scattered outside the computer room. Walking through the computer room, built to accommodate a single minicomputer, was a challenge because the System/38 has not yet been moved out. Floor fans were set up and aimed right at the AS/400 because the air-conditioning system had been slowing down and MIS did not want to risk an outage.

Even though it will be cleaned up, chances are the department will still feel hectic for some time. Last month's installation was actually the first phase of a bigger project. MIS will be installing AS/400s or System/38s at the five other worldwide C&K locations during the next three years.

A software selection team made up of end users was planning to pick an MRP II package Friday. The software will first be implemented at headquarters and then moved out to the other locations, according to Irwin.

By 1991, all divisions should be running the same software on the same hardware platform, Irwin said. This is a plan originally put into place in the early months of 1988. When it became clear that IBM would be announcing a System/38 follow-on in mid-1988, Irwin decided to move in IBM's direction. The company had been relying for years on an assortment of System/36 and 38 hardware, although none of the divisions ran the same software.

Bozman

CONTINUED FROM PAGE 25

tem records data on a standard 3480-compatible cartridge. That same cartridge can then be placed in an IBM 3480 cartridge drive, and the data is easily transferred to the IBM host mainframe.

"The 5461 cartridge is the same cartridge used with the IBM 3480 and Memorex Telex 5480 [drives]," a Memorex release said. "This allows the user with a mix of IBM 3090, IBM 4300 and mid-range systems to have the tape cartridge portable between all CPUs in the installation." The 5461, which costs $42,509 for a single unit, replaces an older IBM 3430 or 3422 tape drive, Memorex said.

On the personal computer level, Irwin Magnetic Systems in Ann Arbor, Mich., announced that IBM had chosen to use its 80M-byte minicartridge tape backup drive in the IBM Personal System/2 line. Once recorded on the PS/2, the data on the Irwin minicartridge tape can then be "walked over" to an Apple Macintosh. It can also be used to transfer data to a Compaq computer or IBM Personal Computer AT that uses a 5¼-in. disk drive. That way, the minicartridge overcomes the incompatibility between the PS/2's 3½-in. floppy disks and the PC AT's 5¼-in. floppy disks.

"Tape isn't just for backup anymore. It's for data handling," said Douglas White, vice-president of communications at Irwin Magnetics. "It's a very interesting concept that people haven't really picked up on. Tape backup is thought to be an arcane art. A lot of people don't see the versatility of tape as a data transfer device."

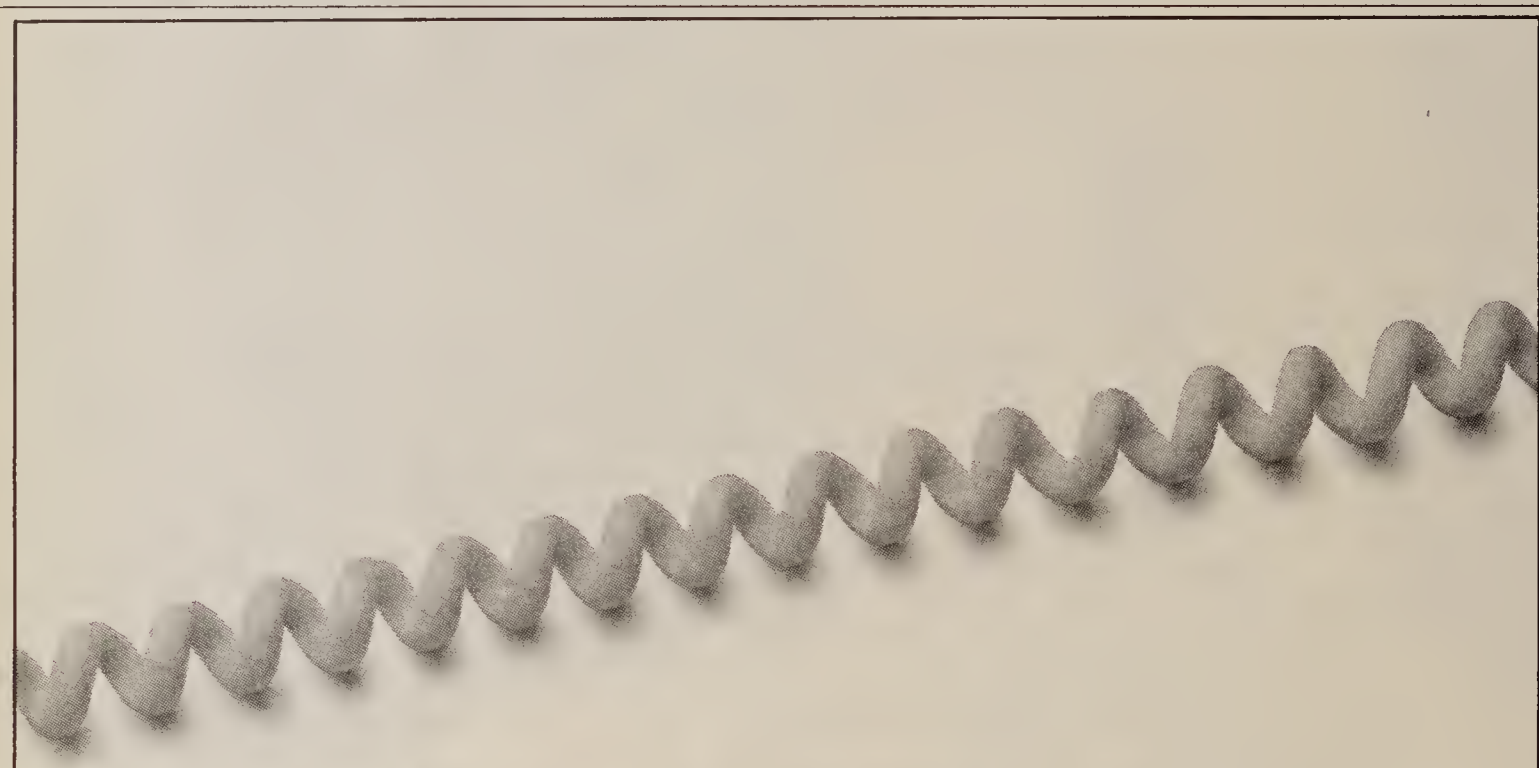
But in companies in which Macintoshes and IBM PCs are cohabiting, the cartridge solution is a good one — particularly in cases where one type of computer is on the West Coast and the other is on the East Coast. Cartridges can be sent in the mail or by overnight carrier.

Even within a single office, the tape cartridge shuffle may prove an economical solution. The Irwin 80M-byte drives cost IBM PC owners $849, White said, while Mac owners will have to ante up $1,600.

What is the moral to the story? Well, the computer industry has taken great strides toward compatibility during the last five years. State-of-the-art systems keep advancing in function and offering more power at lower prices. But the cost of wholesale conversion to the new systems is still high. Common sense tells us that people aren't going to "change out" all the mid-range System/38s or PC ATs they own. Most times, users would prefer a practical alternative to walking on "the bleeding edge." And, in the case of tape drives, that winning move could just be the old end run.

Speaking of which, happy football season.

Bozman is *Computerworld*'s Chicago-based Midwest bureau chief.



IS THIS YOUR LINE OF ACTION?

If the telephone is your line of action, one of the ways to keep information moving up that line is through voice processing.

And if you need to know more about voice processing, there's no better place than Wang Information Services Corp. (WISC).

Whether you're a small company or large, one thing's for sure. Wang Information Services Corp. can meet your voice processing needs today and tomorrow—all the way up the line.

How? By offering what you need when you need it.

Like our DVX® Voice Mail and Voice Update Services, two applications that can improve the flow of communications within your business and quickly put information in the hands of those who need it. And what's more—all you need is a telephone to use it.

Or like our hardware, for flexibility only hardware can provide. You can either buy it and run it yourself, or you can let us do it. It's your choice. That's the way it should be.

So whichever way you want to go to improve voice communications within your company, Wang Information Services Corp. is there with you. For consultations, for support, for the long run. To keep your line of action moving.

For more information call 1-800-TEL-WISC.

WANG

Wang Information Services Corp., A subsidiary of Wang Laboratories, Inc., One Industrial Ave., Lowell, MA 01851. DVX® is a registered trademark of Wang Laboratories, Inc. © 1988 Wang Laboratories, Inc.

Duncan

CONTINUED FROM PAGE 29

cept are revolutionizing systems development. Quality assurance would do well to closely watch these emerging techniques and be prepared to relinquish its comforting grasp on the aging tools and techniques that have been adequate.

Of all the current buzzwords, "strategic" seems to be enjoying the greatest popularity. Pick up any computer magazine and "strategic advantage," "strategic mission" and "strategic this-that" will leap at you from the pages.

Within the organization, quality assurance must get involved in long-range planning. This will enable quality assurance projects to be initiated that correspond directly to departmental and corporate goals.

The advantage of tying quality assurance to strategic plans is this: Because benefits from quality assurance reputedly manifest themselves only in the long term — typically 18 months to two years — synchronizing projects to long-range planning will tend to be supportive of quality assurance efforts.

Approval of quality assurance projects is rarely an easy task, which is probably why quality assurance staff are exemplary proponents of the "ask forgiveness, not permission" philosophy. Quality assurance staff must be prepared to "steal" time to experiment with new tools and methodologies. Often, this will allow collection of real evidence of quality improvement and cost savings to support proposals for future quality assurance projects.

Continuing education is a significant activity in quality assurance. Conference attendance, local quality assurance groups and peer organization information-sharing are all good sources of knowledge. However, self-teaching must generously supplement any budgeted training.

Quality assurance is relatively new to the data processing industry; as such, the tendency of the quality assurance staff is to indulge only in textbook practices or in what one picked up at the latest conference without truly determining the efficacy and value of one's actions. Realistically, quality assurance can only succeed when it focuses firmly on departmental and corporate goals and integrates itself into the strategy for achieving those goals.

Duncan is a quality assurance consultant at a major Dallas bank.

NEW PRODUCTS — SYSTEMS

Data storage

A tape management system that allows the sharing of as many as four separate tape drives among two to four micro or minicomputers has been announced by **Iverson, Inc.**

Iverson Tape Manager (ITM) consists of an electronic digital switch that is reportedly transparent to the system software. Via the Pertec interface, the system offers support for Sun Microsystems, Inc., Digital Equipment Corp., Data General Corp. and IBM platforms. The ITM has 16 configurations.

The Iverson Tape Manager is priced from $1,950.

Iverson, 1 Sanders Ave., San Anselmo, Calif. 94960. 415-459-5665.

Data General Corp. has announced a 5¼-in. 322M-byte Winchester disk drive for use with the company's Combined Storage Subsystem for Departmental Computers (CSS/DC) and the Combined Storage Subsystem (CSS) product families.

Designated the **Model 6491**, the new drive is said to increase maximum disk storage capacity for the mid-range and high-end DG MV computer family by 37%. The product features an 18-msec average seek time and an 8.33-msec average rotational latency. The drive includes a one-year warranty.

The Model 6491 costs $7,500.

Data General, 4400 Computer Drive, Westboro, Mass. 01580. 617-366-8911.

I/O devices

A 12 page/min. laser printer that was designed for use with IBM's System/36, 38 and Application System/400 minicomputers has

Acom's *System/36 laser*

been announced by **Acom Computer, Inc.**

The **5212E Postmaster** laser printer includes an envelope feeder and is available with three paper cassettes capable of holding 250 pages each. It comes with an envelope bin that can hold 100 envelopes. The product is said to have a 25,000 page/month duty cycle and is especially suited for word processing in a medium-size office environment.

The 5212E Postmaster costs $6,945.

Acom, 2250 Obispo Ave., Long Beach, Calif. 90806. 213-498-3638.

A family of impact printers designed to address the high-speed printer marketplace has been announced by **Storage Technology Corp.**

The **5000E Series Printer Subsystem** line consists of three models: the **E21**, the **E28** and the **E50**. The single-hammer-bank E21 reportedly operates at a maximum print speed of 2,100 line/min. The heavier duty cycle, dual-hammer-bank E28 prints at 2.8K line/min., and the E50 offers operator-selectable speeds of 3K, 3.8K and 5K line/min.

All three units include a proprietary print-band technology that utilizes a photo-etching process to ensure high-quality character definition and long band life, the vendor said.

The 5000E Series Printer Subsystems range in price from $35,000 to $74,000 depending on model. Existing 5000 Printer Subsystems are field-upgradable to a 5000E device for $3,800.

Storage Technology, 2270 S. 88th St., Louisville, Colo. 80028. 303-673-5151.

Systems software for MVS data centers:

Enter the world of total resource management, total support.

Computer Associates announces the industry's most extensive, integrated software for systems managed storage environments:

CA-UNIPACK™/SRM
STORAGE AND RESOURCE MANAGEMENT
Consisting of: CA-1™ or CA-DYNAM®/TLMS, CA-ASM2™, CA-BLOCKMASTER™, CA-SORT®, CA-SRAM® and CA-UCANDU®.

CA-UNIPACK/SRM completely automates storage and resource management functions in even the most complex data center environments. It provides comprehensive tape and DASD management facilities, sort/merge and file manipulation utilities and comprehensive management reporting.

CA-UNIPACK/SRM optimizes storage utilization, often eliminating the need for costly additional hardware. It ensures data integrity by enforcing installation-defined storage standards and protecting data resources. It increases data center productivity by eliminating labor-intensive, error-prone tasks, freeing up valuable staff, as well as by reducing job elapsed times through faster and more efficient sorting.

Only Computer Associates has the products and expertise to provide this cost-effective, total solution.

And only Computer Associates offers **CA-UNISERVICE®/II**, a secure link between your mainframe and CA's Customer Service System 24 hours a day. You get online access to software fixes, interactive problem resolution, plus product tutorials and more!

Call Dana Williams today:
800-645-3003 (Ext. 1040).

© 1988 Computer Associates International, Inc.
711 Stewart Ave., Garden City, N.Y. 11530-4787

COMPUTER ASSOCIATES
Software superior by design.

- World's leading independent software company.
- Broad range of integrated business and data processing software for mainframe, mid-range and micro computers.
- Worldwide service and support network of more than 100 offices.

Resource & Operations Management • Financial • Banking • Graphics • Spreadsheets • Project Management

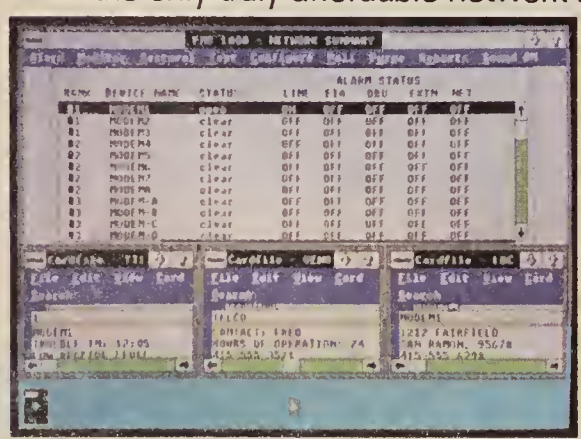
3 things a modem network management system has never been till now:

Simple. Affordable. Fujitsu.

Introducing FMS 1000™—Fujitsu's answer to costly, complicated network management systems.

Like other systems, FMS 1000 lets you manage your communications network pro-actively instead of reactively. To reduce downtime. Increase productivity. And keep users happy.

But unlike other systems, FMS 1000 is simple to use and a snap to install. It's built on industry-standard hardware and Microsoft's® popular, powerful Windows software. And best of all it sets a new standard in price-performance, making it the only truly affordable network management system of its kind for growing companies.



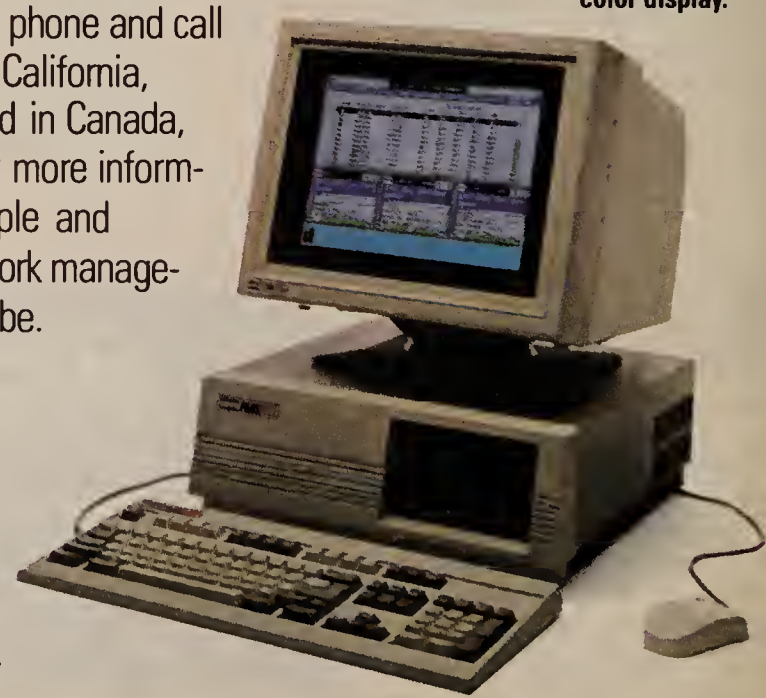
Microsoft's mousedriven Windows software makes FMS 1000 network management functions easy to learn and use.

There's a reason we can offer so much for so little: Fujitsu's single-board modem technology. Proprietary LSI technology that makes our LN line the world's smallest, most integrated networked modems. Modems so reliable, they come with an outrageous guarantee: should one fail during the first year, we'll give you another modem free. And fix the first one, also for free.

Fujitsu's space saving LN modems: sophisticated yet easy to use.

That's Fujitsu Modem Insurance*—backed by one of the best nationwide service networks in the business.

Now that you know a thing or three about this new system, there's just one thing more to do: pick up the phone and call 800-422-4878, in California, 408-434-0460, and in Canada, 416-673-8666, for more information on how simple and affordable a network management system can be.



The FMS 1000 controller features an industry standard format and high-res color display.

FUJITSU

**The limited offer for Fujitsu Modem Insurance is only open to new purchases of LN, L and EZ modems from an authorized Fujitsu America distributor and is subject to the terms of our Modem Insurance Policy.*

FMS 1000™ is a trademark of Fujitsu America, Inc.
Microsoft® is a registered trademark of Microsoft Corporation.

FUJITSU AMERICA
DATA COMMUNICATIONS

A series of high-speed scanners for converting hard-copy images into digital form have been announced by **Versatec**, a Xerox company.

The units reportedly connect to IBM and Digital Equipment Corp. host systems.

The **900 series** scanners are available in 30-, 42- and 60-in. widths. Two standard-resolution scans are offered: 200 point/in. and a selectable version with 200, 300 and 400 point/in. capacity.

Five models are available, with prices starting at $37,000.

Versatec, 2710 Walsh Ave., Santa Clara, Calif. 95051. 800-538-6477.

Connectronix Corp. has announced the **CC 7319** internal twin-axial interface card for use with Epson America, Inc. printers.

The card and printer combination reportedly provides full IBM 5219 printer emulation, allowing Displaywrite/36 and Text Management/38 compatibility. The output device is for the IBM mid-range line of computers, including the Application System/400 series.

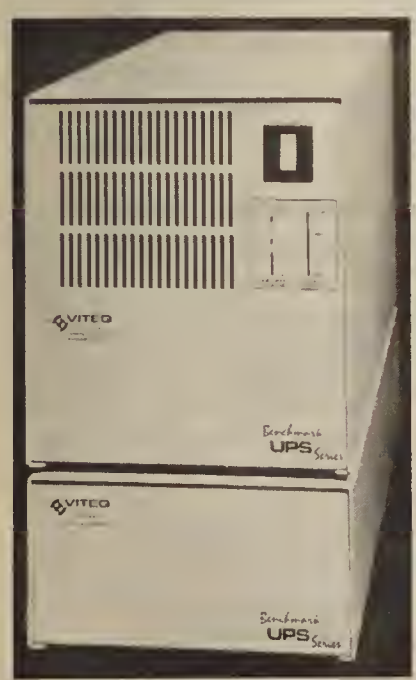
The CC 7319 is priced from $1,195.

Connectronix, 2252 S., 3600 W., Salt Lake City, Utah 84119. 801-975-7477.

Power supplies

Viteq Corp. has announced the **Benchmark UPS Model 15A**, a power supply that is reportedly rated for 12A service.

According to the vendor, the unit does not require a dedicated line to be installed. The product will protect any minicomputer — or other type of equipment load that is rated at 12A or lower



Viteq's *12A power supply*

— from all types of line disturbances.

The unit reportedly can accommodate input voltage fluctuating from 90 to 140V.

The Benchmark 15A price ranges from $1,795 to $3,395.

Viteq, 10000 Aerospace Road, Lanham, Md. 20706. 301-731-0400.

An on-line uninterruptible power supply (UPS) system that was designed for use with large microcomputers as well as small minicomputers has recently been announced by **Lowell Corp.**

The **Emerson AP101 series** UPS reportedly provides 120 VAC or 240 VAC, plus or minus 2%, and 60Hz plus or minus 0.05%, with total system support during brownouts or blackouts.

The system is available in 3-, 5- or 10-kVA configurations, and options include an RS-232 port, remote alarm relays, extended battery time and up to six receptacle panels, according to the vendor.

The Emerson AP101 UPS ranges in price from $9,000 to $17,000, depending on power rating, the vendor said.

Lowell, P.O. Box 158, Worcester, Mass. 01613. 508-756-5103.

A **power distribution unit** designed to distribute electrical power to mainframes and their peripherals has been announced by **International Power Machines.**

The product eliminates the need for permanent wiring, the vendor said, and is available in configurations offering from 30 to 225 kVA.

The units are priced from $5,700 to $19,000, depending on power requirements and options purchased.

International Power Machines, 2975 Miller Park N., Garland, Texas 75042. 214-272-8000.

Systems software for MVS data centers:

Enter the world of total production control, total support.

Computer Associates introduces CA-UNIPACK™/APC, the only production control software system to offer real solutions that meet the growing demand for unattended operations.

CA-UNIPACK/APC-AUTOMATED PRODUCTION CONTROL
Consisting of: CA-SCHEDULER® or CA-7™, CA-11™, CA-OPERA™, CA-PRODICT™, CA-JCLCHECK™, CA-DISPATCH™ and CA-RAPS®.

Unattended operations is now a reality because CA-UNIPACK/APC provides automation for the entire production operation. Automating: workload planning and scheduling, production JCL set up and validation, realtime monitoring and problem identification, restart and recovery, console activity management and report distribution.

As an advanced, integrated production control system, CA-UNIPACK/APC creates a synergy that results in startling productivity gains including improved workload throughput, system availability and end-user service levels.

Only Computer Associates has the products and expertise to provide MVS data centers with such a cost-effective, total solution.

And only Computer Associates offers CA-UNISERVICE®/II, a secure link between your mainframe and CA's Customer Service System, 24 hours a day. You get online access to software fixes, interactive problem resolution, plus product tutorials and more!

Call Dana Williams today: 800-645-3003 (Ext.1040).

© 1988 Computer Associates International, Inc.
711 Stewart Ave., Garden City, N.Y. 11530-4787

COMPUTER ASSOCIATES®
Software superior by design.

• World's leading independent software company.
• Broad range of integrated business and data processing software for mainframe, mid-range and micro computers.
• Worldwide service and support network of more than 100 offices.

Resource & Operations Management • Financial • Banking • Graphics • Spreadsheets • Project Management

International Data Corporation

Attend the Systems Integration Event of the Year!

International Data Corporation, Computerworld & Federal Computer Week Present
Systems Integration Business Strategies: Managing Clients, Contractors and Profits

October 31 - November 1, 1988
Ritz Carlton Hotel
Washington, D.C.

We have unlocked the secrets of many of the most successful vendors, users and industry watchers. Attend this one and a half-day seminar for an in-depth analysis and innovative insights that will lead you to success in the complex and dynamic systems integration market.

The Program

Day 1 — Monday

Introduction - Thomas Swithenbank, President & COO, IDC; Fritz Landmann, President, Computerworld; Steven Woit, Publisher, Federal Computer Week

Keynote Address - Dr. Walter Culver, Corporate VP, Computer Sciences Corp.

Leading Edge Technologies - Ken McPherson, Director/ Software Vendor Research, IDC; Ellen Staelin, Manager/ Technology Futures Service, IDC

Corporate Networks - Mark Leary, Director/Communications Research, IDC

CIM - Scott Brady, Senior Consulting Manager, Arthur Andersen & Company

ADAPSO - George T. DeBakey, Executive Director, ADAPSO; Robert Laurence, President, Oracle Complex Systems Corp, Inc.

Government Trends - Dr. Thomas R. Davies, General Manager, Systems and Computer Technology

Contractual Issues - Theodore Ryan, President, Business Development Division, Electronic Data Systems

IBM Perspective - Gerald Ebker, VP & President, Systems Integration Division, IBM

Public & Private Sector User Panel

Day 2 — Tuesday

Concurrent Case Study Presentations:

Federal Government Panel - Peter Bracken, VP Federal Systems Integration, Martin Marietta Data Systems; M. Dendy Young, Chairman, Falcon Systems

Commercial Panel - Robert Henderson, Marketing Director, NCR Corp.; Ann Lazerus, Marketing Director, McDonnell Douglas; Judy Hamilton, Partner, Arthur Young & Co.

Investor's View - Stephen McClellan, VP Securities Research & Economics, Merrill Lynch

Human Resources Issues - Peter Sandiford, President & COO, SHL Systemhouse

Marketing Systems Integration - Karen Kugel, Director/Systems Integration Services, IDC

Sponsored by International Data Corporation, the world's leading research, analysis and consulting firm on the information industry.

Register Early: Attendance is limited. Phone or mail your reservation today to assure your place at this important event. Contact Paula Zinck at (800) 343-4952. In Massachusetts, call (508) 872-8200.

☐ **YES!** Reserve my place at Systems Integration Business Strategies.

☐ $995 fee enclosed ☐ Bill my company P.O. # _____

Name _____

Title _____ Phone _____

Organization _____

Address _____

City _____ State _____ Zip _____

Additional Registrant Fee - $795
Please photocopy this form and mail to: International Data Corporation, 5 Speen Street, Framingham, MA 01701

NEW PRODUCTS — SOFTWARE

System software

Software Pursuits, Inc. has announced a new option for its **MVT/VSE** operating system that reportedly permits IBM VSE users to address as many as 64M bytes of real memory.

The operating system runs on IBM 3090, 3080 and 4381 machines as well as most Amdahl Corp. and National Advanced Systems computers. It features a multiple address spaces function that allows as many as 16 16M-byte address spaces.

MVT/VSE is available on a monthly rental basis or with a two-year lease. Pricing starts at $760 per month.

Software Pursuits, Suite 200, 1420 Harbor Bay Pkwy., Alameda, Calif. 94501. 415-769-4900.

A multiuser, multitasking operating system for real-time VME applications is available from **Radstone Technology**.

Microware OS-9 was designed for the Motorola, Inc. 68000 family of VMEbus processors and is available in versions for both professional development environments and read-only memory-based industrial systems.

The product employs modular programming techniques, and the system can be reconfigured by adding or subtracting modules without reverting to the source code, the vendor said.

Pricing for Microware OS-9 ranges from $200 to $900, depending on configuration.

Radstone Technology, 1 Blue Hill Plaza, Pearl River, N.Y. 10965. 800-368-2738.

Database management systems

Data General Corp. has announced **DG/Ingres** for its DG/SQL relational data base management system.

According to the vendor, DG/Ingres is a comprehensive application development environment that was developed in conjunction with Relational Technology, Inc.

The product reportedly offers decision support and application development tools integrated with DG's DG/SQL relational DBMS and CEO Office Automation. It will be marketed and supported exclusively by DG.

DG/Ingres is priced from $1,260.

DG, 4400 Computer Drive, Westboro, Mass. 01580. 508-366-8911.

Information Builders, Inc. has announced the availability of an interface between Focus for Digital Equipment Corp. VAX products and Britton Lee, Inc. Shared Database Systems.

Focus Interface reportedly allows all of the Focus software reporting, graphics, spreadsheet and data analysis facilities to directly access data stored on Britton Lee systems. According to the vendor, records are accessed directly using optimized SQL queries. Users may access Britton Lee databases simultaneously from both DEC VAX/VMS and IBM VM/CMS platforms.

The interface costs from $420 to $14,000.

Information Builders, 1250 Broadway, New York, N.Y. 10001. 212-736-4433.

Development tools

A menu-driven journal management and file recovery system has been introduced by **On-Line Software International, Inc.**

Filesave/RCS was designed to assist systems programmers, data administrators and other operations personnel in developing a complete recovery system for managing both on-line and batch journals. It will also perform forward or backward recovery of partially corrupted files, the vendor said. The program runs in IBM's OS under MVS and MVS/XA.

Filesave/RCS' introductory price is $12,500 per CPU.

On-Line Software, 2 Executive Drive, Fort Lee, N.J. 07024. 800-642-0177.

Systems software for MVS data centers:

Enter the world of total security, total support.

Computer Associates announces the industry's only complete security software solution:

CA-UNIPACK™/SCA
SECURITY, CONTROL AND AUDITING
Consisting of CA-ACF2™ or CA-TOP SECRET®, CA-VMAN™ and CA-EXAMINE™.

Utilizing advanced security techniques and integrated, industry-leading software, CA-UNIPACK/SCA provides total access control, enhanced network security and complete MVS operating system auditing capabilities–including virus detection.

With the industry's largest and most knowledgeable security staff, Computer Associates alone has the resources and expertise to provide this cost-effective solution. And no one else can match CA's commitment to the present and future of the security industry.

And only Computer Associates offers **CA-UNISERVICE®/II**, a secure link between your mainframe and CA's Customer Service System 24 hours a day. You get online access to software fixes, interactive problem resolution, plus product tutorials and more!

Call Dana Williams today:
800-645-3003 (Ext.1040).

© 1988 Computer Associates International, Inc.
711 Stewart Ave., Garden City, N.Y. 11530-4787

COMPUTER ASSOCIATES®
Software superior by design.

- World's leading independent software company.
- Broad range of integrated business and data processing software for mainframe, mid-range and micro computers.
- Worldwide service and support network of more than 100 offices.

Resource & Operations Management • Financial • Banking • Graphics • Spreadsheets • Project Management

© 1988 Data General Corporation

"The Data General difference: unparalleled reliability."

Dieter M. Bailly, Vice President, Systems and Data Services, Sitmar Cruises

Data General computers help Sitmar Cruises achieve high customer service standards.

Sitmar Cruises, one of the world's leading cruise lines, prides itself on warm, professional customer service. So its passengers keep coming back again and again.

One important aspect of their service is up-to-the-minute information on tour package availability, cabin assignments, bookings, destination schedules, on-board activities and more.

This requires computers that are up and running continuously.

On shore, since most bookings and cabin assignments are processed immediately by reservation agents, any disruption of system availability can lead to service delays, or the increased costs of hiring supplementary agents. At sea, dependable system performance is vital to keep inventories and passenger billing under control.

Sitmar's need for highly reliable computers, backed by outstanding service and support, is clear. So is their choice of a computer company.

Data General combines a commitment to reliability with innovative service geared to maximizing system availability.

As Dieter Bailly, Vice President of Systems and Data Services, says, "Hardware reliability and effective service response are two critical factors contributing to high computer up time. Data General consistently provides both. Hardware reliability is a must for a cruise line, since the reservation function is real time. And, for our vessels, you can't just call for maintenance in the middle of the ocean."

To find out how Data General can make a difference for you, send the coupon below. Or call 1-800-DATAGEN. In Canada, call 416-823-7830.

Data General

3400 Computer Drive, Dept. ADV/SIT, Westboro, MA 01580
Please send me the current issue of PROFILES.

Name_____
Company_____
Address_____ Phone_____
City_____ State_____ Zip_____

CALL 1-800-DATAGEN

Languages

Cobra Systems Software, developer of the mainframe Cobol generation product Cobra, has announced a new version of software that will run on IBM Personal Computers and compatible systems.

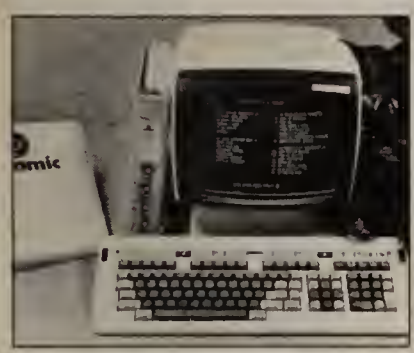
Called **Cobra/PC**, the product reportedly uses fourth-generation language-type free-form statements to create structured Cobol code. According to the vendor, the system will decrease programming time while providing easily maintained, standardized, structured Cobol. Programs may also be uploaded to the mainframe for compilation.

Cobra/PC requires a minimum of 384K bytes of memory and two disk drives for operation. Its license fee is $495.

Cobra, Suite 1, 505 Acadia Drive, Petaluma, Calif. 94975. 707-763-5123.

Applications packages

A sales analysis software tool that allows users to develop sales reports has been added to the



Compusource's *sales tool*

Dynamic manufacturing resource planning (MRP II)-based manufacturing system from **Compusource Corp.**

Dynamic 4.21 is an MRP-II-based production, inventory control and accounting system designed for all Data General Corp. computers running AOS or AOS/VS. It incorporates eight menu-driven screens that allow choice of information display or print-out by report, file, priority, sequence, selection criteria, time and other formats.

Dynamic 4.21 costs from $9,000 to $40,000, depending on hardware installation and total number of users.

Compusource, 21735 S. Western Ave., Torrance, Calif. 90501. 213-328-5150.

Harris Data Services, Inc. has announced **Cobra**, a system software package for IBM System/36 users.

Cobra is a health care and insurance package designed for businesses that have 20 or more employees and must comply with the federal Consolidated Omnibus Budget Reconciliation Act. Features reportedly include transactions such as qualifying events, coverage selections, changes in coverage and conversion elections.

The product also offers claims-tracking and a customized notice- and letter-writing facility.

The Harris Data Cobra System costs $3,000 and will interface with Harris Data Personnel and Payroll Systems.

Harris Data Services, Suite 200, 611 N. Barker Road, Milwaukee, Wis. 53186. 414-784-9099.

Utilities

Softool Corp. is now shipping **Release 1.2.0.0** of its **Change and Configuration Control** (CCC) environment to Honeywell Bull, Inc. users.

CCC reportedly offers control over changes to individual components within versions of information as well as configuration management capabilities.

CCC 1.2.0.0 running on the Honeywell Bull GCOS 8 system costs $30,000.

Softool, 340 S. Kellogg Ave., Goleta, Calif. 93117. 805-683-5777.

Kisco Information Systems has enhanced **F1 Manager**, its disk management package developed for IBM's System/36.

According to the vendor, **Level 3.0** can back up files, libraries and folders in either department or application groups. It can also specify retention periods for disk files and will provide for files to be saved off-line prior to expiration processing.

F1 Manager 3.0 costs $250.

Kisco, Suite 4-J, 120 Beverly St., Mt. Kisco, N.Y. 10549. 914-241-7233.

Systems software for MVS data centers:

Enter the world of total administration, total support.

Introducing **CA-UNIPACK™/DCA**–an advanced software system from Computer Associates that automates the complex tasks of MVS data center management.

CA-UNIPACK/DCA-DATA CENTER ADMINISTRATION
Consisting of CA-NETMAN™/FINANCIAL, CA-NETMAN™/PROBLEM and CA-NETMAN™/OLCF.

CA-UNIPACK/DCA automates and integrates: hardware and software inventory management, help desk and problem tracking, configuration changes, invoice reconciliations, cost allocations, budgets, vendor contracts, user chargebacks, order tracking and more. It has the unique ability to interrelate these diverse activities so that a change in one area is immediately and automatically reflected in another.

CA-UNIPACK/DCA provides online, realtime control over critical managerial functions while it reduces costs, increases staff productivity and ensures sound decision making. Total administrative control. Only from Computer Associates.

And only Computer Associates offers **CA-UNISERVICE®/II**, a secure link between your mainframe and CA's Customer Service System 24 hours a day. You get online access to software fixes, interactive problem resolution, plus product tutorials and more!

Call Dana Williams today:
800-645-3003 (Ext.1040).

© 1988 Computer Associates International, Inc.
711 Stewart Ave., Garden City, N.Y. 11530-4787

COMPUTER® ASSOCIATES
Software superior by design.

- World's leading independent software company.
- Broad range of integrated business and data processing software for mainframe, mid-range and micro computers.
- Worldwide service and support network of more than 100 offices.

Resource & Operations Management • Financial • Banking • Graphics • Spreadsheets • Project Management

Epson Equity II+. 80286 microprocessor; 8/12MHz selectable clock speed; 640K RAM; choice of single floppy drive or floppy drive with 40MB hard drive; AT-style keyboard; support for 3.5" floppy drive; monochrome, CGA or EGA enhanced color monitor; MS-DOS 3.3; optional 80287 math co-processor; one year limited warranty. Epson is a registered trademark of Seiko Epson Corporation. Equity is a trademark of Epson America, Inc., 2780 Lomita Blvd., Torrance, CA 90505. **(800) 922-8911.**

"I've been looking for a computer that's right for my business. **A computer with the perfect combination** of speed, memory and features for the things I do every day. Spreadsheets, reports, presentations, graphs. The Epson Equity II+ is it."

Choosing a computer for your business is more than a decision you live with. It's one you work with—every business day. Which explains why so many businesses are choosing the Epson® Equity™ II+.

At 12MHz, this fast 286-based computer can make short work of mainstream business tasks. As your business expands, so can the Equity II+. There are six expansion slots for adding more memory, graphics or communications capabilities, plus room for up to three half-height storage devices.

Even with all its power, the small footprint **Equity II+** won't overpower your desk. Best of all, you're getting more than a performance-minded machine. You're getting an Epson. A name that's recognized for outstanding reliability, value and support.

And every business can use a little more of that.

EPSON

WHEN YOU'VE GOT AN EPSON, YOU'VE GOT A LOT OF COMPANY.™

There are terminals. And there are terminals.

You will never see an ordinary terminal with the name IDEA on it.

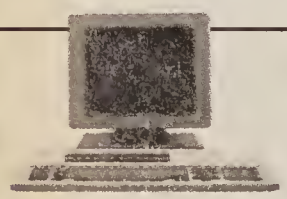
Because if we can't build a terminal with a better idea behind it, we won't build it at all.

Of the vast number of terminals made for IBM's AS/400 and other midrange systems, only one is built to support virtually every type of office printer. Ours. Only one is built to support graphics in 5224/5225 emulation. Ours. And only one is backed by six years of experience in PC-to-3X communications. Ours. The IDEA 197.

The fact is, if we can't add value to something through better technology, we won't build it. Whether it's a terminal, board or chip.

And if you think that's an intelligent idea, give us a call at 1-800-257-5027.

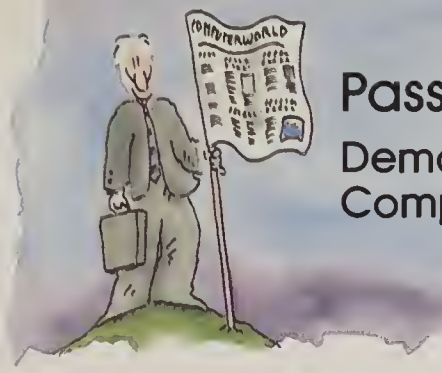
IDEAssociates®



The intelligence to do things better.

IDEAssociates, Inc., 29 Dunham Road, Billerica, MA 01821, (508) 663-6878, Telex 4979780; France, Hong Kong, Germany, United Kingdom.

IDEA and IDEAssociates are registered trademarks of IDEAssociates, Inc. IBM is a registered trademark and AS/400 is a trademark of International Business Machines Corporation.



Pass along readers, unite!

Demand your own copy of Computerworld.

YES, I want to receive my own copy of COMPUTERWORLD each week. I accept your offer of $44* per year — saving over 56% off the single copy price. In addition, as a subscriber, I understand I will receive bonus issues of COMPUTERWORLD FOCUS at no extra charge.

First Name MI Last Name

Title Company

Address

City State Zip

Address Shown: ☐ Home ☐ Business Single Copy Price: $2.00

* U.S. Only. Canada, Central America & South America $110/Europe $165. All countries $245 (Airmail). Foreign orders must be prepaid in U.S. dollars.

Please complete the information to the right to qualify for this special rate.

COMPUTERWORLD

1. **BUSINESS/INDUSTRY** (Circle one)
   - 10. Manufacturer (other than computer)
   - 20. Finance/Insurance/Real Estate
   - 30. Medicine/Law/Education
   - 40. Wholesale/Retail/Trade
   - 50. Business Service (except DP)
   - 60. Government — State/Federal/Local
   - 65. Communications Systems/Public Utilities/Transportation
   - 70. Mining/Construction/Petroleum/Refining/Agric.
   - 60. Manufacturer of Computers, Computer-Related Systems or Peripherals
   - 65. Computer & DP Services, including Software/Service Bureau/Time Sharing/Consulting
   - 90. Computer/Peripheral Dealer/Distributor/Retailer
   - 75. User Other _____
   - 95. Vendor Other _____ (Please specify)
2. **TITLE/FUNCTION** (Circle one)
   - **IS/MIS/DP MANAGEMENT**
   - 19. Vice President, Asst VP
   - 21. Dir., Mgr., Suprv., IS/MIS/DP Services
   - 22. Dir., Mgr., Suprv., of Operations, Planning, Adm. Services
   - 23. Dir., Mgr., Suprv., Analyst, of Systems
   - 31. Dir., Mgr., Suprv., of Programming
   - 32. Programmer, Methods Analyst
   - 35. Dir., Mgr., Suprv., OA/WP
   - 36. Data Comm Network/Systems Mgt
   - **OTHER COMPANY MANAGEMENT**
   - 11. President, Owner/Partner, General Mgr
   - 12. Vice President/Asst VP
   - 13. Treasurer, Controller, Financial Officer
   - 41. Engineering, Scientific, R&D, Tech. Mgt
   - 51. Sales/Mktg Mgt
   - **OTHER PROFESSIONALS**
   - 60. Consulting Mgt
   - 70. Medical, Legal, Accounting Mgt
   - 60. Educators, Journalists, Libranans, Students
   - 90. Others _____ (Please specify)
3. **COMPUTER INVOLVEMENT** (Circle all that apply) Types of equipment with which you are personally involved either as a user, vendor, or consultant
   - A. Mainframes/Superminis
   - B. Minicomputers/Small Business Computers
   - C. Microcomputers/Desktops
   - D. Communications Systems
   - E. Office Automation Systems
   - F. No Computer Involvement

E4840-5

Pass along readers, unite!

Demand your own copy of Computerworld.

YES, I want to receive my own copy of COMPUTERWORLD each week. I accept your offer of $44* per year — saving over 56% off the single copy price. In addition, as a subscriber, I understand I will receive bonus issues of COMPUTERWORLD FOCUS at no extra charge.

First Name MI Last Name

Title Company

Address

City State Zip

Address Shown: ☐ Home ☐ Business Single Copy Price: $2.00

* U.S. Only. Canada, Central America & South America $110/Europe $165. All countries $245 (Airmail). Foreign orders must be prepaid in U.S. dollars.

Please complete the information to the right to qualify for this special rate.

COMPUTERWORLD

1. **BUSINESS/INDUSTRY** (Circle one)
   - 10. Manufacturer (other than computer)
   - 20. Finance/Insurance/Real Estate
   - 30. Medicine/Law/Education
   - 40. Wholesale/Retail/Trade
   - 50. Business Service (except DP)
   - 60. Government — State/Federal/Local
   - 65. Communications Systems/Public Utilities/Transportation
   - 70. Mining/Construction/Petroleum/Refining/Agric
   - 60. Manufacturer of Computers, Computer-Related Systems or Peripherals
   - 65. Computer & DP Services, including Software/Service Bureau/Time Sharing/Consulting
   - 90. Computer/Peripheral Dealer/Distributor/Retailer
   - 75. User Other _____
   - 95. Vendor Other _____ (Please specify)
2. **TITLE/FUNCTION** (Circle one)
   - **IS/MIS/DP MANAGEMENT**
   - 19. Vice President, Asst VP
   - 21. Dir., Mgr., Suprv., IS/MIS/DP Services
   - 22. Dir., Mgr., Suprv., of Operations, Planning, Adm. Services
   - 23. Dir., Mgr., Suprv., Analyst, of Systems
   - 31. Dir., Mgr., Suprv., of Programming
   - 32. Programmer, Methods Analyst
   - 35. Dir., Mgr., Suprv., OA/WP
   - 36. Data Comm Network/Systems Mgt
   - **OTHER COMPANY MANAGEMENT**
   - 11. President, Owner/Partner, General Mgr
   - 12. Vice President/Asst VP
   - 13. Treasurer, Controller, Financial Officer
   - 41. Engineering, Scientific, R&D, Tech Mgt
   - 51. Sales/Mktg Mgt
   - **OTHER PROFESSIONALS**
   - 60. Consulting Mgt
   - 70. Medical, Legal, Accounting Mgt
   - 80. Educators, Journalists, Librarians, Students
   - 90. Others _____ (Please specify)
3. **COMPUTER INVOLVEMENT** (Circle all that apply) Types of equipment with which you are personally involved either as a user, vendor, or consultant
   - A. Mainframes/Superminis
   - B. Minicomputers/Small Business Computers
   - C. Microcomputers/Desktops
   - D. Communications Systems
   - E. Office Automation Systems
   - F. No Computer Involvement

E4840-5

NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

BUSINESS REPLY MAIL
FIRST CLASS PERMIT NO. 55 MARION, OH 43306

POSTAGE WILL BE PAID BY ADDRESSEE

COMPUTERWORLD

P.O. Box 2044
Marion, Ohio 43306-2144

NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

BUSINESS REPLY MAIL
FIRST CLASS PERMIT NO. 55 MARION, OH 43306

POSTAGE WILL BE PAID BY ADDRESSEE

COMPUTERWORLD

P.O. Box 2044
Marion, Ohio 43306-2144

MICRO BITS

Douglas Barney

Note from a slime-slinger

Are you a slime-wart? We recently got a letter from a gentleman with a unique perspective on IBM and its harmful effects on America. The argument was that IBM is too big, too monopolistic and thoroughly disruptive to the purity of capitalism.

IBM is also becoming too proprietary with the Micro Channel and too controlling by demanding royalties for alleged patent infringement on the Micro Channel and reduced instruction set computing.

The bottom line, according to the writer, is that anybody who buys a Personal System/2 is a slime-wart. He says that like it's a bad thing. Having become a slime-wart (that's journalism) many years before the PS/2 introduction, I, along with the three million slime-warts that bought PS/2s, am insulted.

Did they or didn't they? At the recent Extended Industry Standard Architecture (EISA) announcement, Phoenix Technologies officials boasted that the new bus was little more than the old PC ET, a 32-bit standard that Phoenix first proposed

Continued on page 54

Mac price hikes fishy, users say

Corporate customers question reasons, unevenness, timing of increases

BY JULIE PITTA
CW STAFF

CUPERTINO, Calif. — Corporate users of Apple Computer, Inc.'s Macintosh personal computer are speaking out against Apple's recent price increases and may alter their purchasing decisions as a result.

"We're not happy," said Angelo Micheletti, a technical service manager at Bechtel Group, Inc.'s AI Institute. "I don't think it's made many friends."

Like others, Micheletti questioned the reasons behind the hike. Apple blamed the increase on rising component costs and changing global market conditions and cited the scarcity of dynamic random-access memory chips.

An Apple spokeswoman said she expects demand for the Mac to remain strong.

However, Mac prices did not increase incrementally, users noted. For example, a standard Mac II with 1M byte of RAM increased by $1,100 to $4,869. An upgraded version with a 40M-byte hard disk and the same 1M byte of RAM as the standard model experienced only an $800 hike to $6,169.

Also, Apple raised Mac prices months after other PC vendors had made adjustments because of the DRAM crunch. In fact, many PC vendors have said the memory-chip shortage is beginning to ease. The dramatic increase in Mac prices might have been more palatable to users had it coincided with other pricing changes from other vendors.

"It's a tactical error," said Mike Bailey, a systems integrator at Lockheed Corp.'s Missiles & Space Systems. "Now that memory prices are going down, they raise the price on the Macintoshes. Something smells funny."

Some users said they will consider alternatives to the Mac.

Mary Howlett, manager of office automation at Hughes Aircraft Co.'s Ground Systems Group, said the increase will cause her group — the largest of

Continued on page 54

Utility finds files in library

BY STEPHEN JONES
CW STAFF

TORRANCE, Calif. — Ashton-Tate Corp. announced a software utility aimed at helping microcomputer users who are tired of rummaging through endless application files in search of one tiny nugget of information.

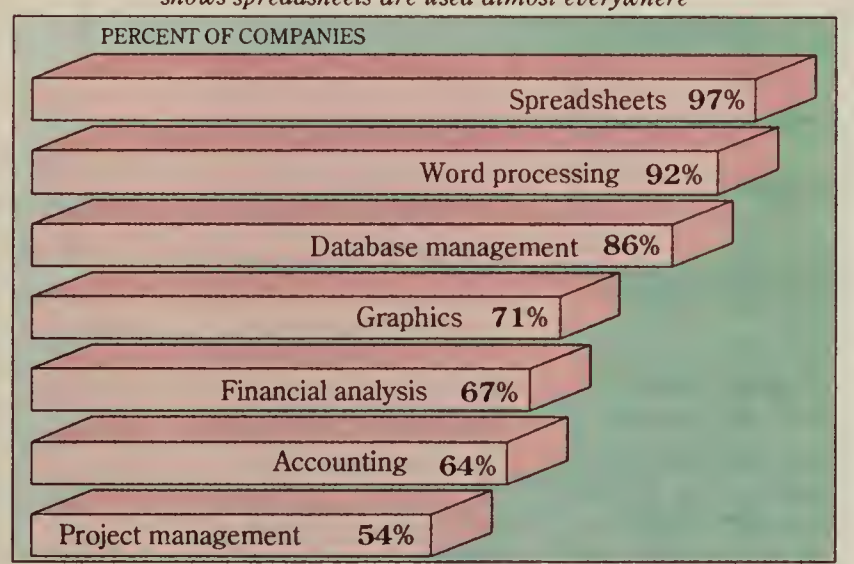
Turbosearch is an information retrieval program designed to quickly search through reams of data and fetch a piece of information located in a word processor, database or spreadsheet file.

Continued on page 49

Data View

Top PC tools in big firms

A tally of types of applications installed at 196 large companies shows spreadsheets are used almost everywhere



SOURCE: INTERNATIONAL DATA CORP.
CW CHART

Samna does graphics now

BY MICHAEL ALEXANDER
CW STAFF

ATLANTA — There is a new graphics-based word processing package on the market from Samna Corp. that the company hopes will be perceived as being as friendly as its name.

Samna's Ami, French for "friend," is aimed at the casual user who wants the benefits of desktop publishing but not the headaches often associated with page-layout programs, according to Said Mohammadioun, the company's chairman and chief executive officer. He stressed, however, that the program is a word processor, not a desktop publishing program.

"We define the market by the way people work, not by the contents of the document being published," he said during a recent product demonstration. "We're staying away from the desktop publishing market."

Continued on page 52

Inside

- The whys and wherefores of PCs at Hughes Aircraft. Page 47.
- The last Word in processing. Page 47.
- Redline out with CPU platform. Page 55.

Sage Software... A Leading Mainframe Tools Developer Becomes a PC Tools Leader

It's easy to describe the ideal world for developing COBOL applications. You want the fast turnaround, ease of use and interaction that come with working at a PC. You need the COBOL functionality that is typical of the mainframe. And it wouldn't hurt a bit if you could emulate mainframe environments like IMS or CICS on your PC.

Micro Focus turns the ideal into reality with the Micro Focus COBOL/2 Workbench.™ If that sounds a little too good to be true, listen to what Senior Vice President Gary Greenfield of Sage Software, Inc., has to say.

"Micro Focus products provide a high level of mainframe compatibility, a rich set of software development tools and a wide range of mainframe environment emulation products. Those same qualities make Micro Focus COBOL the right target as the output of our application generation products."

Micro Focus gives Sage Software the best of the mainframe and PC worlds. High productivity. Fast debugging. Full mainframe compatibility. PC-based emulation of IMS/VS DB/DC, CICS and DL/I. It all helps Sage Software stay a leader in the fiercely competitive application development tools market.

Become a leader in your own software development environment. Develop PC-based COBOL applications. Use PCs to develop and maintain mainframe COBOL programs. It's time to make your move into the best world for COBOL application development. Call Micro Focus.

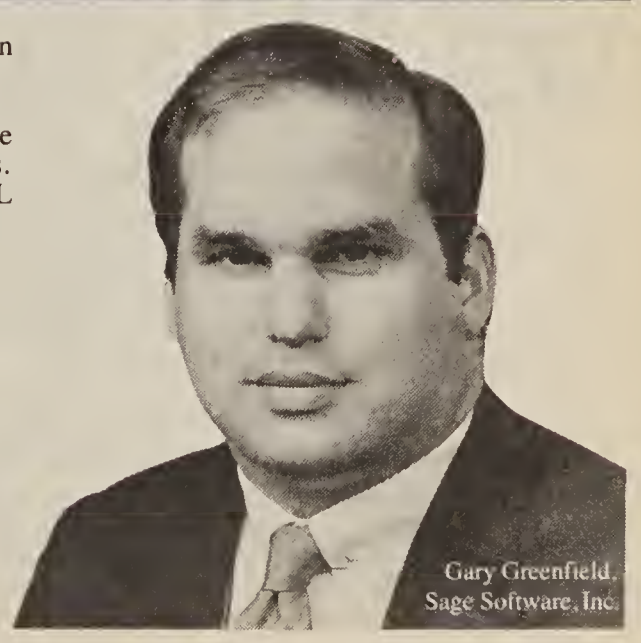
1-800-872-6265

U S: 2465 E. Bayshore Road
Palo Alto, CA 94303 (415) 856-4161

U K: 26 West Street
Newbury, Berkshire RG13 1JT (0635) 32646

MICRO FOCUS®

A Better Way of Programming™



Gary Greenfield, Sage Software, Inc.

Why Treat The Symptoms Of Network And Systems Pains When You Can Have The Cure?

Losing sleep over Computer Operations nightmares?

The SYS/MASTER™ component of NET/MASTER™ gives you the automation you've only dreamed about. SYS/MASTER automates complex operations tasks and resolution of problems (even at remote sites).

Feeling uneasy about Network Access and Security?

NET/MASTER gives you easy and secure network access for automated management of your network. Authorized users can utilize as many applications as they like—eliminating multiple terminals and long log-on procedures.

Tired of the bandage approach to Network Management?

The NET/MASTER Advanced Network Management component lets you take control of your network by automating the resolution of complex problems you're faced with daily. No matter what multi-vendor strategy or what architecture you choose, NET/MASTER is the place to start.

Finding it hard to stomach the usual File Transfer problems?

Transfer commercial volumes faster and more reliably than other software products or courier services. Automate the complete process of transferring and using data with the worry-free NET/MASTER File Transfer component.

Looking for relief from Help Desk headaches?

Give your Help Desk the serious tools they need to automate problem, change and configuration management tasks. Make manual tasks a thing of the past with the INFO/MASTER component of NET/MASTER.

Get NET/MASTER™. It's Serious Medicine.

Only NET/MASTER from Cincom® provides serious, permanent solutions with a comprehensive, fully integrated system of components: with easy installation and fast-acting implementation that gets right to the source of all your problems.

NET/MASTER lets you automate and manage your network and systems with greater control, efficiency and reliability than any product on the market today. And NET/MASTER gives you functionality and flexibility that unmatched, single-solution products just can't provide.

Join over 700 organizations who have found permanent relief with NET/MASTER. To find out more, call us today, toll-free, at:

1-800-543-3010

In Ohio, 513-661-6000 • In Canada, 1-800-387-5914

CINCOM®

The Better The Solution, The Better The Value℠

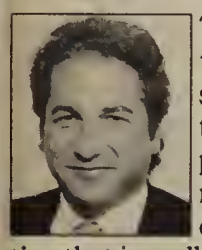
International Regional Headquarters:/Maidenhead, UK (0628) 72731 • Paris (1) 45456779
Frankfurt (69) 719070 • Tokyo (03) 438-2791

© 1988 Cincom Systems, Inc.

SMALL TALK

Mort Rosenthal

Who should we listen to?



The recent introduction of several good text retrieval programs makes me think of one application that is really needed: a program to audit the predictions of industry analysts.

This package would be designed to retrieve every analyst's prediction for the last six months and check who was right and who was wrong, which predictions mattered and which ones did not. Industry pundits whose predictions did not jibe with reality would not be allowed to open their mouths for at least a month. OK, OK, make it a week. Admittedly, I do not know how the software package will enforce this last part.

Actually, industry analysts serve a very important purpose — to keep all of us honest by serving as watchdogs over the business. But what frustrates me is how disconnected they sometimes are from the reality of users and what they are really doing with personal computers.

One example comes to mind. The instant a product is announced, it becomes the main topic of discussion by analysts. The product's merits, though barely known, are immediately debated, its success and future are predicted, its sales curve is plotted — and its sur-

Continued on page 52

Mac boosters abound at Hughes

Ground Systems manager aggressively promotes Apple PC as standard

BY JULIE PITTA
CW STAFF

Hughes Aircraft Co.'s Ground Systems Group, one of six operating groups that make up the giant military and defense contractor, has what are considered to be the most discriminating personal computer users within Hughes.

That group — Hughes' largest, with an estimated 12,000 employees — designs state-of-the-art air defense systems and naval electronic systems.

When Mary Howlett became manager of Ground Systems' office automation department two years ago, she found "floundering users" with no centralized PC purchase and support.

Her team jumped in, evaluated products, made purchasing recommendations and answered myriad questions from users — a rather imposing job, considering that group has more than 5,000 PCs.

Recently, Howlett talked with *Computerworld* West Coast correspondent Julie Pitta.

What is the procedure for purchasing new products?

It's a three-step process. First the user must fill out a requisition form justifying the purchase, stating the reason for the purchase and alternatives that have been reviewed. Then it goes up the chain of management within that division. Once approvals have been secured, it comes up to us for a final review.

What are your standards?

We have three. In the IBM world, we've stopped buying ATs for now; we've moved to Personal System/2s. With Hewlett-Packard, it's the Vectra line. With the Macintosh, they can buy the II or the SE.

How do you evaluate new products at Hughes?

We have good nondisclosure relationships with all three of our vendors so that we can get information early. Once it becomes available, we then bring it into our advanced products laboratory for evaluation. We also invite users from the division to come in and try them out. If everything is satisfactory, we add it to the list.

Why the Macintosh?

The Mac came to our company much the same way it came into others — through the back door. It appealed to users who were not computer-literate and didn't want to go to the trouble of learning a DOS machine. A lot of them were brought in for simple word processing or presentations graphics. There were so many of them being used within Hughes that we had to recognize it as a standard. We placed it on the list, but we didn't vigorously encourage its use.

Since then, Apple has done a lot of things in the communications area that have made us feel more comfortable. We're now aggressively pushing the Mac as a standard.

Has Apple been responsive to your needs?

Much more so recently than in the beginning. They've added staff to their national accounts team. They seem to recognize that companies like Hughes need a dedicated staff. In the beginning, we didn't have a corporate purchasing agreement with Apple. We bought the Mac from local retailers. We won't do that if we can get a good price from vendors like IBM, Hewlett-Packard and Apple.

We also like to know a vendor's product plans in advance; we'd like to think we influence them. It's easier for us to plan for the future if we know what's coming.

Howlett *watched the Mac come in Hughes' back door*

What has been the biggest challenge in integrating the Mac at Hughes?

The greatest challenge that we face with all the personal computers, in general, is getting the access to the data.

Our business runs off of mainframe data. Our users obtain reports off of mainframe data, and in order to get the particular extractions, they have to rekey it into a personal computer. Where the real benefit will be gained is through direct file transfer and easier manipulation of the data. We have to do that more effi-

Continued on page 49

SOFT TIPS

Pitching patchware

You may have already found that there is a production error that exists on the first system disk of Ashton-Tate Corp.'s Chart-Master that causes the fourth choice on the Produce Chart menu to read exporting files instead of reading the Polaroid Palette program. Fortunately for the user, there is a patch disk available intended to correct this problem.

To install the disk, the user must simply substitute the patch disk with System Disk One.

A warning: Be sure that you back up your charts before installing the patch disk.

Information provided by Corporate Software, Inc., a Westwood, Mass.-based software reseller.

PC users remain true to their Word

BY STEPHEN JONES
CW STAFF

REDMOND, Wash. — Users of Microsoft Corp.'s Microsoft Word may flirt with the idea of moving to a jazzed-up word processor from another vendor, but many have said they would rather stick with the tried and true capabilities of Word.

Users point to a variety of features, including advanced text editing and ease of use, that keep them faithful users of Word. But a less tangible factor seems to keep many users true to their Word and less willing to jump to such competing programs as Wordperfect Corp.'s Wordperfect.

Word is the word processor many users have grown up with, a reliable program that introduced users to word processing when it was first released more than five years ago.

"I've experimented with other programs, but I have come back to Word every time — it covers everything we need," said Jeff Segal, vice-president of creative affairs at cartoon giant Hanna-Barbera Productions, Inc. in Los Angeles. Segal has been a Word devotee since the product originally shipped.

Microsoft has regularly enhanced the program, adding enough features to keep up with the competition and keep users happy. The latest upgrade is Word 4.0, which has been on the market for about one year at a cost of $450.

Segal said the most notable enhancement to Word 4.0 is its increased flexibility, allowing users to liberally modify the format of a document. All 40 function keystrokes included with Word 4.0 can be remapped by the user.

Segal and 25 story editors at Hanna-Barbera use Word to edit animation scripts that are formatted to meet the editors' particular needs. One function key modification was used to reflect the editors' own styles of outlining a script.

The user interface is also a winning point for Segal, who said Word 4.0's on-line tutorial and simple use of cursor keys are features that make the program easy to use.

"Even somebody who has had little experience on a computer can easily pick up Word and get going," Segal said.

Those kinds of features helped Word keep its status as the word processor of choice at Hughes Aircraft Co. in Tuscon, Ariz., despite a challenge from Wordperfect. Tim Davis, a senior project engineer at Hughes, said he was impressed with Word 4.0's combination of increased speed and graphics capabilities, along with its overall ease of use.

Microsoft Word 4.0

Price: $450

- Requires IBM PC XT, AT, PS/2 or compatible.
- Minimum of 320K bytes with two floppy disk drives or one floppy and one hard disk.
- Features WYSIWIG graphics, spell-checker and style sheets.

"It's powerful enough to meet our needs for a variety of users turning out a variety of documents," Davis said. "I haven't seen anything that Wordperfect has to offer that would cause me to make a wholesale switch."

Davis had been disappointed with Word 3.0's performance when working in the program's graphics mode. While in that mode, users see a what-you-see-is-what-you-get (WYSIWYG) screen display of what a document will look like when printed.

Word 4.0 boosted the speed of the graphics mode enough to make the WYSIWYG function useful for Davis. "There is finally enough speed so that the graphics mode is usable — now you can actually scroll through a document in graphics mode and not get frustrated by its slowness," Davis said.

Davis runs Word on both IBM Personal Computer ATs and Personal System/2 Model 60s.

But Word does not stack up to

Continued on page 48

TAB™

The ONLY complete IDMS/R development and execution environment on the PC.

To see the latest exciting developments in TAB and TAB/NET attend a free seminar in your area.

1988 Fall Seminar Schedule

September	22	Boston
	27	New Jersey
	29	New York City
	30	Washington DC/VA
October	12	Philadelphia
	18	Atlanta
	19	Dallas
	20	Houston
	25	Minneapolis
	26	Chicago
	27	Denver
	31	Portland
November	1	Seattle
	2	Los Angeles
	3	San Francisco

Don't take our word for it . . .

"Not only does TAB's compatibility with IDMS mean added flexibility in data management, but the cost savings can be staggering for a major corporation offloading some or all of its IDMS development onto the PC."

—PC TECH Journal, March 1988

TAB Benefits:

- Offload Mainframe Development to an easy to use, more productive menu-driven environment.
- Offload existing IDMS/R applications for Run-Time execution without re-writing.
- Reduce training cost by offloading to TAB.
- Use IDMS/R development personnel (without re-training) to write PC-based applications.
- Reduce the cost of mainframe resources by offloading Development and Execution.
- Faster, less expensive and more predictable turnaround and reduced development cost.
- Interacts with various CASE Tools and Application Generators.

TAB Products Include:
TAB/NET
TAB/CENTRAL (Integrated Data Dictionary)
TAB/4GL (ADSA, ADS/O, OLM)
TAB/COBOL Batch/DC/CICS DML
Query and Update Facility
'C' Interface Support
SQL Query & Report Writer
TAB Run-Time System
TAB BMS-OLM Conversion

Reserve your place now!
Call: 914-735-1444

Online/Database Software, Inc.
One Blue Hill Plaza
Pearl River, NY 10965
Call: 914-735-1444

The Application Builder is a registered trademark of Online/Database Software, Inc.

IDMS/R, ADSA, ADS/ONLINE are products of Cullinet Software

Help on the way for 1-2-3 users with dolled-up fonts from Funk

BY DOUGLAS BARNEY
CW STAFF

CAMBRIDGE, Mass. — For Lotus Development Corp. 1-2-3 users who feel left out of the spreadsheet publishing revolution spearheaded by Microsoft Corp.'s Excel, help is on the way.

Funk Software, Inc., which is renowned for its product that allows 1-2-3 users print large worksheets sideways, will soon let those same users print out worksheets dolled up with fonts, various-size type faces, shading and other new touches.

The $149 Allways allows for spiffed-up spreadsheets to be printed on a wide range of printers, from the choicest laser to the lowliest dot matrix, said Jim Kinlan, Funk's director of new product marketing.

"It makes the most of the printer you have," Kinlan explained.

According to the vendor, the product is expected to bolster Lotus' defense against the graphical Excel, which created the minor but growing trend called spreadsheet publishing.

Do it yourself

Like desktop publishing, spreadsheet publishing simply jazzes up output and at the same time reduces the need to rely on outside artists and typesetters to create fancy documents.

To invoke Allways, users hit a hot key and, with Lotus-style menus, go about altering the spreadsheet.

However, when in Allways mode, users cannot enter data but rather have to hot-key back to 1-2-3 itself for any types of modifications.

According to the vendor, one drawback to the initial release is the inability to create a file usable by the vast majority of desktop publishing packages. For now, at least, users will have to be satisfied with spreadsheet-only output.

A later version will provide this capability, Kinlan promised.

The product is scheduled to be available early this month and works with 1-2-3 Release 2.0 and 2.01.

True to Word

CONTINUED FROM PAGE 47

Wordperfect when it comes to importing graphics into the word processing program, Davis said.

With Word, a user has to create a graphic image in the Pageview mode using Microsoft's Windows environment. To add the graphic to the Word document, the file has to be imported into Pageview; the graphic is then placed in the document.

The task is much simpler with Wordperfect, because a user can import a graphic in one step without going through the tedious steps of exiting the document and entering a Pageview-type environment, Segal said.

> "THERE IS finally enough speed so that the graphics mode is usable — now you can actually scroll through a document in graphics mode and not get frustrated by its slowness."
>
> TIM DAVIS
> HUGHES AIRCRAFT

Word has also had its problems while running with the Microsoft Mouse. Users have reported that the mouse goes wild when a combination of keystrokes are hit while using Word 4.0. The bug has since been cured by Microsoft.

Segal expressed dissatisfaction with some of the Word defaults, including the "clumsy" file identification card that labels a document by name and length.

He also criticized Word's spell-checker program as being too large a dictionary to easily access and taking too long to load into the program.

Overall, however, users seem content to stay with the reliable Word and wait for minor problems to be cleaned up in future upgrades.

The Future I/S Now.

Will you be positioned for success in 1993?

Five years from now, what will the key elements of successful I/S management be? In this critical seminar Mario Morino, recognized authority on I/S management and products, will discuss the forces and technologies that will shape your future. If you're a decision-maker with bottom-line responsibility for I/S performance, the Morino Executive Seminar will be vital to you.

Morino Executive Seminar

Dallas/Fort Worth—October 19
Chicago—October 21
San Francisco—October 25
New York—November 9
Atlanta—November 17

800-535-1400

You must be preregistered to attend. There is no fee for the Morino Executive Seminar, but attendance is limited. To reserve your place, please fill out and return this card to the address below, or call our seminar coordinator Carol Tacconi at 800/535-1400.

Please register me for the following seminar:

City Date
Name Title
Organization Mail Code
Address
City State Zip Phone (Area Code)

Morino Associates, Inc.
8615 Westwood Center Drive
Vienna, Virginia 22180

cw

MORINO

Floppies let ANSI down

Survey finds most 3½-in. disks just don't meet standards

Personal computer users experiencing data loss anxiety will receive little relief from current 3½-in. data storage cartridge offerings, according to a recent survey.

The market report, compiled after testing 25 brand-name products, found that most of the 3½-in. floppy disks on the market have failed to meet 100% of ANSI criteria.

The study, conducted by Memcon, an Omaha, Neb.-based floppy disk certification service, also reported that only three of the four brands that passed were reasonably priced.

TDK Corp.'s floppies received top billing for quality and price/performance at a cost of $17.50 per box. IBM's floppies were a close second in quality but further back in price/performance at $35.50 per box.

Bottom of the barrel

At the other end of the spectrum, SKC America, Inc. and Dysan Corp. cartridge disks scored the lowest points in quality ratings. A box of 10 SKC floppies carries a price tag of $14.80, while Dysan's cost $18.80.

The most significant of the floppy disk testing criteria is data interchangeability, which is tested using ANSI's missing- and extra-bit standards, a Memcon spokesman explained. Apparently, few of the brand-name floppy disk vendors take ANSI's criteria seriously, he said.

The PC market's 3½-in. data storage cartridge offerings are disappointing because the product technology is still in its early phase, according to the spokesman. "It is obvious that many of these manufacturers don't even intend to meet ANSI's criteria," he said.

Utility finds

CONTINUED FROM PAGE 45

The software can make its rapid-fire searches because of a library system that is used to arrange files according to subject.

The $179 search utility is aimed at business users who deal with large amounts of data in areas such as financial services. With an eye on ease of use, Turbosearch features pull-down menus and a simple grid format that is used to enter search commands, avoiding the need to write complex search equations.

Vicarious innovation

The software utility announcement is characteristic of Ashton-Tate's drive to diversify its product line to include entries into every application segment. But some observers have said that many of the company's new products have not represented Ashton-Tate innovation because they were acquired from outside developers. Turbosearch is one of those products. The program was developed by Idan Software Industries Ltd.

The software was designed to work with files from Ashton-Tate applications, such as Dbase III Plus, but files from other DOS-based applications can be run with Turbosearch if they are converted to ASCII format.

User libraries can be searched by a specific word, file name or string of up to eight words that appear in conjunction with one another. Once the search is completed, a user can pick an item from a listing of all the files that contain the defined target of the search.

Turbosearch runs on IBM Personal Computers and compatible machines. It requires a minimum of 512K bytes of free memory and DOS 2.1 or higher. Ashton-Tate recommends a hard disk and one double-sided disk drive.

Mac boosters

CONTINUED FROM PAGE 47

ciently to ensure the data is more accurate.

How are PCs used in your group?

You name it. Secretaries use them. They're being used in the financial area for financial analysis. They're being used in manufacturing and in engineering for systems design — anywhere automation can save money.

How are Macs being used?

They're being used in much the same places that IBM has been used: in financial analysis, manufacturing and engineering. We're starting to use the Mac in engineering for CAD and CAM, using some commercially available packages.

What was your reaction to the two announcements made by PC vendors last week: the formation of the consortium group to extend the current AT bus and Apple's decision to raise prices?

I think [the consortium] was interesting. We'll want to get more information on that and see what IBM plans to do. I think Apple's decision to raise prices is unfortunate. It makes you wonder if now that they've got a lot of people using the Mac, Apple is trying to increase its revenue. I have news for them — they won't get away with it.

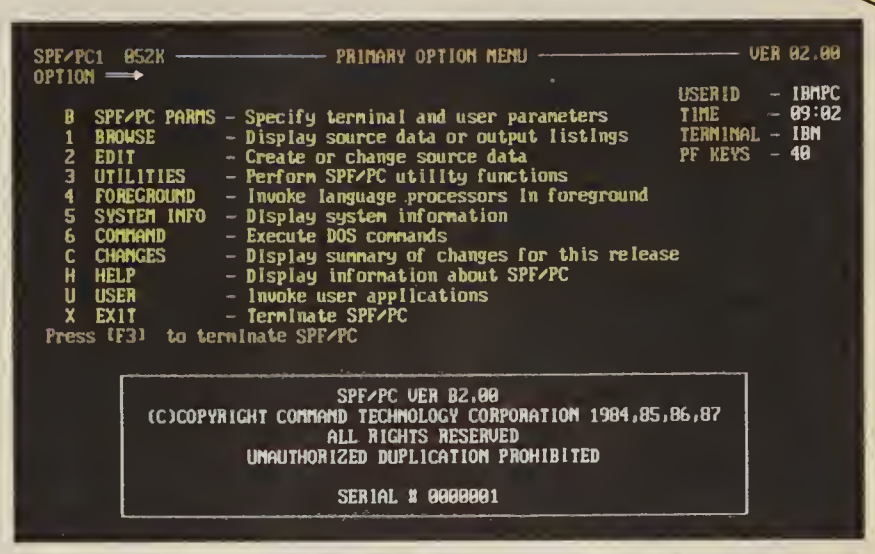
Mainframe Muscle for your PC

SPF/PC™ 2.0

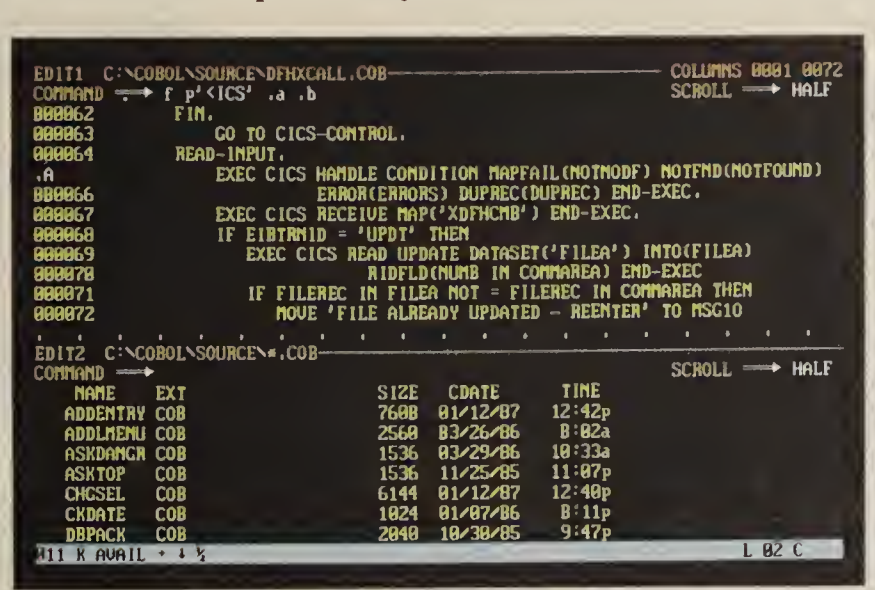
Now you can re-create the mainframe editing environment on your own IBM PC with SPF/PC, the only PC editor functionally equivalent to editing on the IBM mainframe with ISPF/PDF, Version 2, Release 2.

Files of virtually any size may be edited with SPF/PC because it uses all extended or expanded memory, or disk drive work space.

Mainframe users will especially appreciate SPF/PC's familiar commands, fast PC processing, and micro-to-mainframe file portability.



SPF/PC's main menu provides access to the EDIT and BROWSE facilities; utilities for file MOVE, COPY, RENAME, etc.; facilities to access other programs; on-line HELP and more.



Real work in progress on a COBOL file.

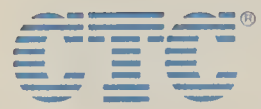
A few other SPF/PC enhancements:

- true split screen
- directory/member lists
- binary file editing
- picture strings
- hexadecimal editing
- 43-line EGA/50-line VGA support

SPF/PC runs under DOS on the IBM PC, XT, AT, PS/2 and all true compatibles; and in DOS emulation under OS/2. Native OS/2 support is in development.

Want proof? Ask us for a free interactive, demonstration diskette.

SPF/PC™ — so much like the real thing, you'll forget you're editing on a PC.



Command Technology Corporation

1900 Mountain Boulevard, Oakland, California 94611 Telephone: (415) 339-3530 FAX:(415)339-3883

IBM

ISN

ISN

AT&T presents the ultimate networking recipe for today's multi-vendor environment.

PRESENTING AT&T's INFORMATION SYSTEMS NETWORK.

Is there a stir going on among your corporate computer systems?

You know the problem: your corporate systems won't talk to each other.

Look at the maze of computers in your company: different brands, different types, bought at different times; different standards – and even with different connection plugs. Does this cause the mainframe in Corporate Planning to ignore the PCs in Development?

The mini in Accounting may have a lot to say, but does it speak only to computers with the same brand name?

And does trying to transfer vital data from computer to computer seem like more trouble than it's worth?

When you have to duplicate databases, you duplicate effort. Why should your company's productivity suffer because your computers won't share a byte?

A PEACEFUL SETTLEMENT.

Save your precious time and resources with AT&T's revolutionary Information Systems Network (ISN). It's designed to solve your communications problems today – and tomorrow. AT&T's ISN is based on standards.

In fact, ISN supports more standards than most networks available today from major vendors. ISN lets your micros, minis, and mainframes talk to one another – instantly and transparently. We offer vital gateways to other vendors, as well as the speed and number of ports you need.

And we offer local and remote management. The chart below gives you all the details.

- **Supported Protocols**: IEEE 802.3, BSC, SNA/SDLC, IBM 3270, HDLC, X.25 Transport.
- **Network Media**: Fiber optic and twisted pair.
- **Host Interface**: AT&T, DEC, IBM.
- **Gateways and bridges to other vendors**: Async hosts, AT&T STARLAN, and ETHERNET bridging, XNS, TCP/IP, DECnet, 3BNET.
- **Speed/ports**: 8.64 Mbps backplane, 48,000 packets per second, 2500 virtual circuits per node.
- **Access Method**: Perfect scheduling.
- **Centralized Management**: *StarKeeper*™ Network Management Systems.

PLAN FOR YOUR FUTURE TODAY.

ISN offers superior price/performance and investment protection in a multi-vendor environment. With ISN, you can base your computer purchases on your vision of the future – not fear of the future.

If your company plans include strategic use of information in a multi-vendor environment, contact your AT&T Account Executive, Authorized AT&T Reseller, or call 1 800 247-1212, Ext. 756. From equipment to networking, from computers to communications, AT&T is the right choice.

ETHERNET is a trademark of Xerox Corporation. DECnet is a trademark of Digital Equipment Corporation. Apple and design are registered trademarks of Apple Computer, Inc. COMPAQ and design are registered trademarks of Compaq Corporation. Digital and design are registered trademarks of the Digital Equipment Corporation. Hewlett-Packard and design are registered trademarks of the Hewlett-Packard Company. IBM and design are registered trademarks of International Business Machines Corporation. NCR and design are registered trademarks of the NCR Corporation. NT and design are registered trademarks of Northern Telecom. Tandy and design are registered trademarks of the Tandy Corporation. Wang is the registered trademark of Wang Laboratories, Inc. Wyse and design are registered trademarks of Wyse Technology. Xerox is a registered trademark of Xerox Corporation.

©1988 AT&T

Samna

CONTINUED FROM PAGE 45

Ami is the first in a generation of visually oriented, easy-to-use word processors, Mohammadioun said. "It's the first word processor to define the whole process in a graphics-based environment in which text is still the primary element."

The program makes extensive use of the graphics features of Microsoft Corp.'s Windows and a mouse to speed the process of creating a document from entering text to editing on a what-you-see-is-what-you-get display, the company said.

Users can select from pull-down menus of command options and dialogue boxes to see the effect of each selection before printing the document. Ami features a draft mode, a text-only display of a file and a default layout mode designed to show the file as it will be printed.

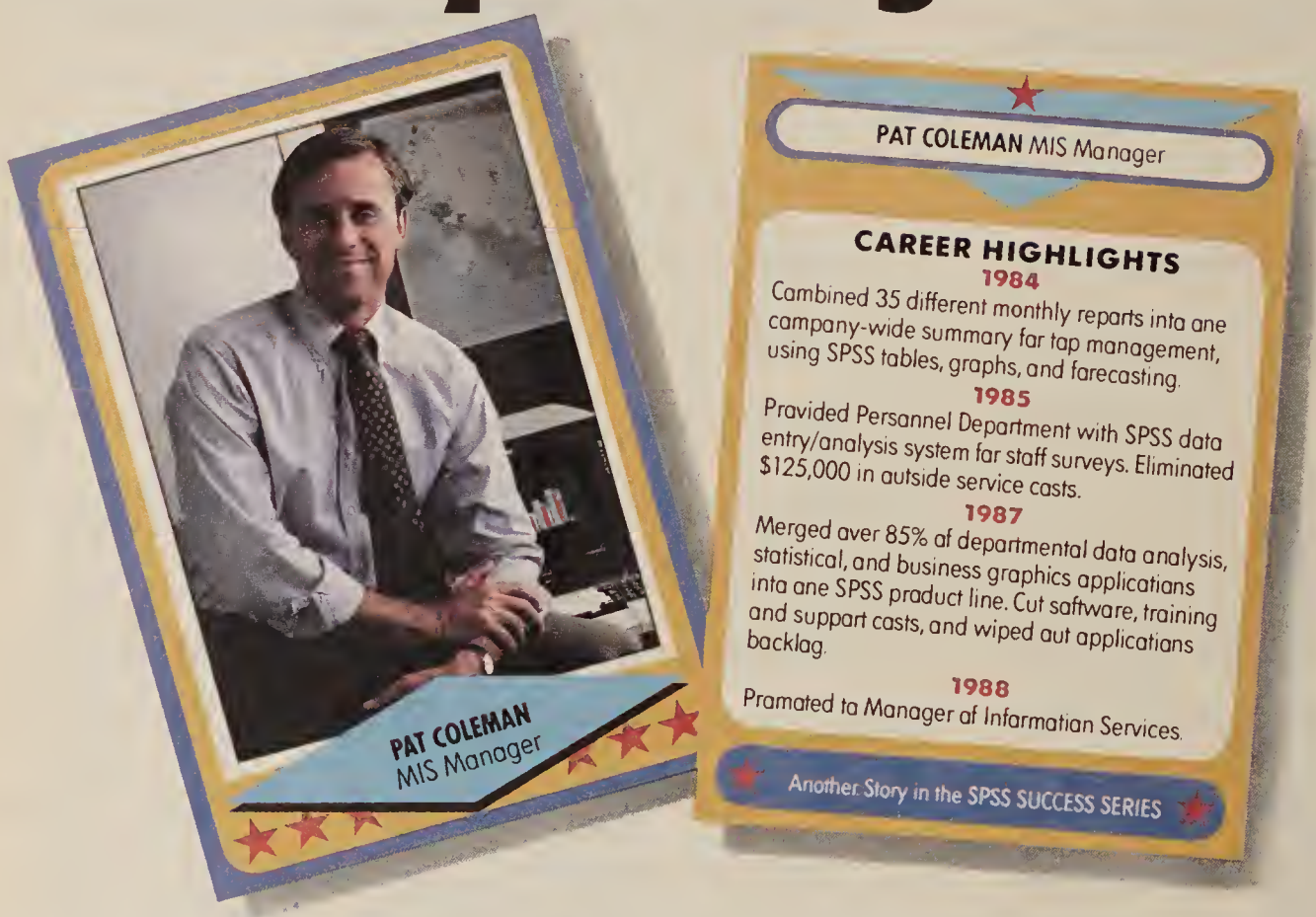
The program also features 25 style sheets — essentially, predefined page layouts of memos, business letters, newsletters, reports and other documents — that writers can use as is or modify. Ami also has such traditional word processing functions as search and replace, cut and paste, hyphenation and text justification and a 130,000-word spelling checker.

The program runs on an IBM Personal Computer AT or Personal System/2 and compatibles with Intel Corp. 80286 or 80386 microprocessors equipped with 640K bytes of random-access memory, Hercules Computer Technology, Inc. graphics adaptor, IBM's Enhanced Graphics Adapter or higher resolution graphics adapter, IBM PC-DOS or Microsoft MS-DOS 3.0 or higher and a hard disk drive. A runtime version of Windows is supplied with Ami, but Samna recommends installing the full version of Windows 2.0 or higher.

The package is available through computer retailers at an introductory price of $149 for the next 90 days; after that, Ami will carry a suggested retail price of $199.

Samna plans to introduce an advanced version of its new word processor called Ami Professional in the second quarter of next year. It will offer additional functions such as mail-merge, thesaurus and drawing capability, Mohammadioun said. It will have a suggested retail price of $495.

We'll take your stats and make you the most valuable player in your league.



Data analysis software from SPSS® gives you the competitive edge.

Producing big numbers is easy. In today's business, it's what you do with those numbers that makes the difference.

That's what SPSS is all about. For over 20 years, our data analysis software has been turning raw data into meaningful statistics, to help you take the uncertainty out of decision making.

The SPSS product family gives you beginning-to-end control. Data entry, basic and advanced statistical procedures, forecasting and time series analysis, presentation graphics and more. With our renowned speed, accuracy, flexibility and ease-of-use all along the way.

We work where you work, providing a common set of tools for every computer class from micros to mainframes. We also supply interfaces to your database, spreadsheet and other application software. This wide range of business capabilities adds up to one major advantage: Letting you get hard and fast answers from your data.

And when you use SPSS software, you get the talent and experience of the SPSS team. Documentation, training and support that's come through for over 1 million users.

For full details on the SPSS data analysis lineup, give us a call at

1-312-329-3324.

We'll show you how to really stand out in your field.

SPSS inc.

Best in the final analysis.

444 North Michigan Avenue • Chicago, Illinois 60611

SPSS is a registered trademark of SPSS Inc.

Rosenthal

CONTINUED FROM PAGE 47

vival or demise is decided. At this point, the analyst (or a member of the press) will call users and ask for a hypothetical prediction of demand for a hypothetical product or a product that has not yet shipped. Now, I think that is pretty silly.

By the time a product ships, all this speculation is old news, and it doesn't seem to matter anymore. Ironically, that is really when the users start to have a real understanding of the product and to care about it.

I usually get called two weeks after the first shipment of a product and am asked, "Is the product successful?" Well, it may have been in the news for a year at that point, but it is impossible to tell much about a product's success for several months. Corporations have to go through evaluation cycles and users need a few weeks to use the product before we know if it will be successful.

You have to remember that these analysts are not in business soley to convey the truth to the industry. They're trying to make a buck, too. As an analyst, you make a buck by either being controversial or by being the first person out with bad news.

On a more positive note, the pundit's real role is to provoke us to think about new technology today and in the future.

I find that the most useful analysts are the ones who cause us to think about emerging technology, who challenge our assumptions about an organization or about a product and inform us about events and conditions that we do not have access to. Also keep in mind that most analysts are not product reviewers. They might point out aspects of a product or technology that they find interesting, but for the most part they are working in a vacuum and talking about a typical user — or their conception of a typical user — as opposed to an actual user who is trying to find software that can do a job.

The outer limits

The analyst's favorite subject is technology, especially its outer limits. Then come products, and only after that come users and real applications. Rarely do analysts discuss such things as distribution channels, customer support and other elements that are extremely important to the success of a product and to the customer.

Users, on the other hand, typically are concerned with getting their jobs done, as distinct from knowing about a particular product and what is neat about it. They are not terribly concerned about a particular technology and what its outer bounds are.

When I think of the role of analysts, I am reminded of such things as artificial intelligence, which continues to be the subject of an enormous amount of press. What we have seen is that AI has sort of snuck into products, such as Lotus Agenda. It has not been the great mass movement that the analysts predicted.

So when should we look to the analysts? Should we pay them heed at all? My advice is that you read what analysts have to say but remember that what you read is not always true.

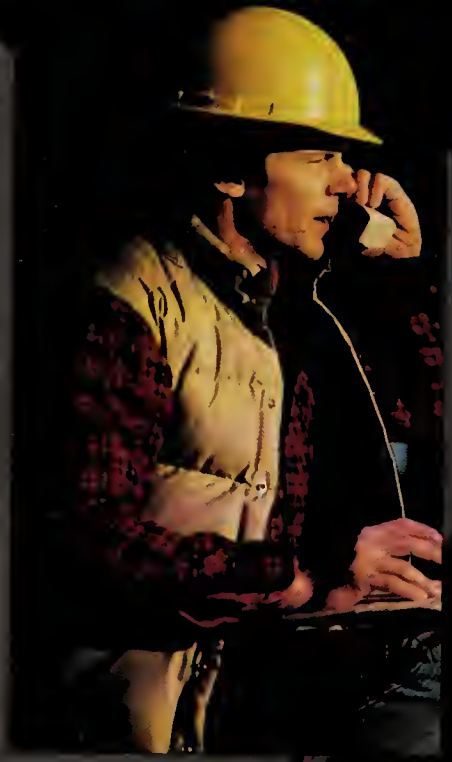
Rosenthal is chairman and chief executive officer of Corporate Software, Inc., a value-added reseller of software and peripherals in Westwood, Mass.

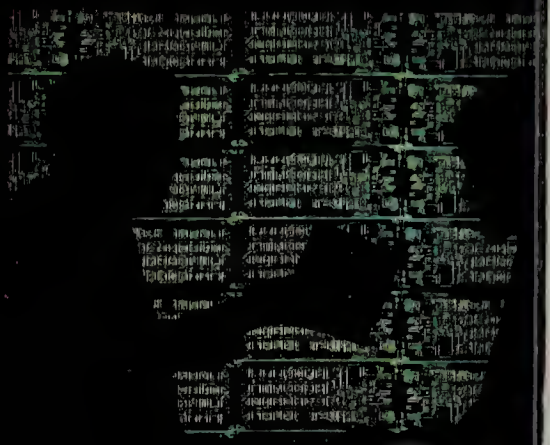
COMMUNICATION
NETWORKS
CONFERENCE & EXPOSITION

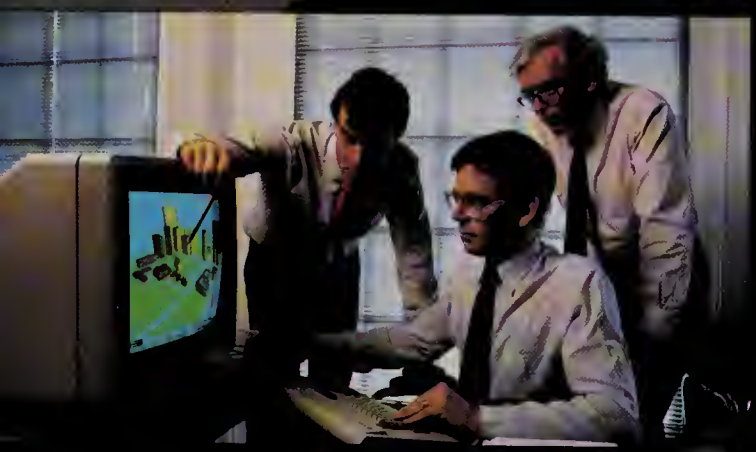
You may win

free admission,
free airfare and
free hotel accommodations.

But what you'll learn
will really make you a winner.







Come to Washington, D.C., and discover the world of communications.

At Communication Networks, you'll meet the players who represent the entire world of voice and data communications technology. And you'll get the information you need to connect *your* organization with the world business community for maximum operating efficiency and productivity.

What's more, CN '89 has been selected by the U.S. Department of Commerce to participate in its elite 1989 Foreign Buyer Program. So you'll have a unique opportunity to learn and share ideas with other professionals like you from around the world.

Join these decision-makers with the same responsibilities, goals and priorities as you:

- ☐ Upper-level managers who want to improve their communications/network-management capabilities
- ☐ Corporate telecommunications and network managers/directors
- ☐ Sales/marketing executives and managers
- ☐ Distributors of communications products/services
- ☐ Communications systems managers/designers
- ☐ Communications planning managers
- ☐ Communications analysts/specialists/programmers/technicians
- ☐ DP/software engineers/managers
- ☐ Systems engineers/engineering managers
- ☐ Product-development/business-planning managers
- ☐ Operations maintenance and installation supervisors/managers
- ☐ Government officials and communications policy makers
- ☐ Consultants

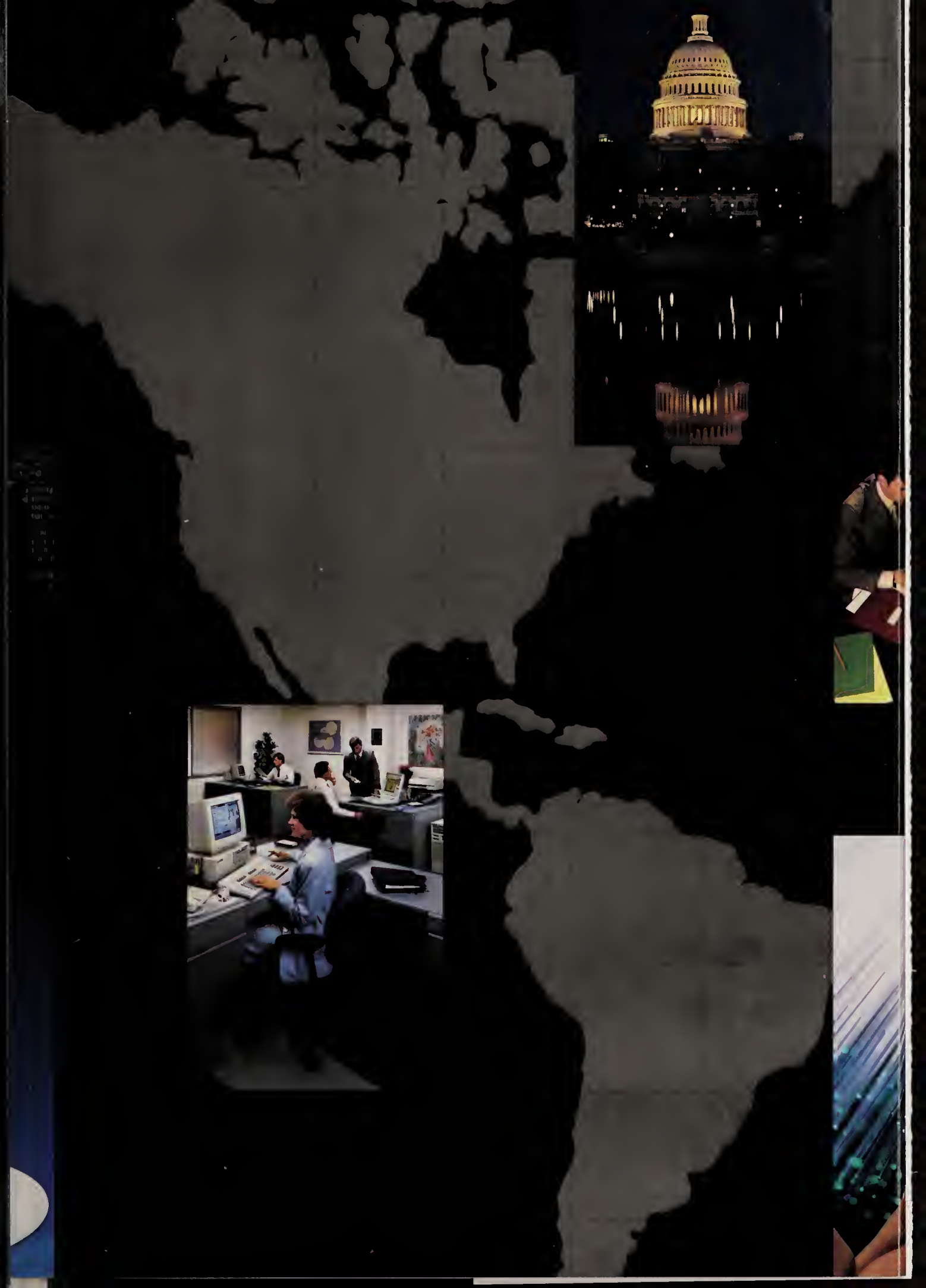
Explore the possibilities, the issues and the solutions that will shape your decision making.

In three intensive days, you'll have your choice of 18 in-depth tutorials and 80 conference seminars covering important subjects, such as:

- ☐ What's new in very large LANS; ISDN; network planning, design and security; and evolving voice and data communications technologies
- ☐ How the new Administration's regulatory and policy decisions will affect your business
- ☐ Which network management technologies may change your long-term planning
- ☐ How to successfully implement multi-vendor communications and achieve true connectivity
- ☐ Plus dozens of other hot topics you want to know more about.

Find out more about Communication Networks... and win!

Plan now to attend CN '89. See the products and systems that will determine how you conduct business for decades to come...and make you a winner. All under one roof. *And see inside for details on how to win it all as part of our exciting "See The Communications World" contest.*



dcca

COMMUNICATION
NETWORKS
CONFERENCE & EXPOSITION

February 6-8, 1989
Washington Convention Center
Washington, D.C.

"See The Communications World" Contest

OFFICIAL ENTRY FORM

Yes, please enter me in your contest and send me all the details about CN '89. I understand that I do not have to register for CN to be entered in the contest.

Name (Please print or type)

Title

Company

Street Address/P.O. Box

City

State Zip

Telephone

Fax

The five communications/network-related topics I'm most interested in are:

Just fill in this Entry Form completely, detach and mail it to:

Communication Networks
"See the Communications World" Contest
P.O. Box 9171, Framingham, MA 01701-9171

Or you may fax your Entry Form to: 1-508-879-4531.
For more immediate information, call toll-free
1-800-225-4698 or 1-508-879-6700, Ext. 646.

COMPUTER WORLD

You'll have free access to over 400 exhibitors who will display and demonstrate the entire range of voice and data communications technology.

ABLE Computer
ACC
Account Data Group
ADC Telecommunications
Alantec
Alcatel Network Systems
Almetek Industries
AMCO Engineering
American Cable Products
American Communications
American Computer & Electronics
American Institute, DataComm Group
American Private Line Services
American Telecorp
Ameritec
AMP
AMR Technical Training
Anderson Jacohson
ANDO
Applied Computing Devices
ARIES Group
ARK Engineering
Artel Communications
Astrocom
Atlantic Research
AT&T
Augat
Avantek
Avanti
Aydin Monitor
BBN Communications
BCR Enterprises
Bell Atlantic
Bellcore
BellSouth
Berk-Tek
Brand-Rex
Bridge Communications
BT Datacom
Bytex
Cable Technology
Canoga Perkins
C-COR Electronics
CCMI/McGraw Hill
Cermelek Microelectronics
Chipcom
Chromatic Technologies
Cincom
cisco Systems
Coastcom
Codex
Coherent
Communications Design
Communications Management Systems
Communications News
Communications Products & Systems
Communications Week
Complementary Solutions
Compression Labs
Computer Intelligence
COMSAT
Comsearch
Comsel
ComStream
Concord Data
Connections
Control Cable
Control Resources
Corning Glass Works
C & S Construction
CTS Fabri-Tek
Cylix Communications
Data America
Data Architects
Data Communications
Data Communications Systems
Data General
Data Set Cable
Data Switch/T-Bar
Datacom Technologies
Datacomm Management Sciences
Datapro Research
Dataprobe
Dataradio
Data-Tech Institute
Datatel
DCA
Develcon
Digilog
Digital Equipment Corp.
Digital Link
Digital Microwave
Digital Pathways
Digital Sound
Digital Transmission Systems
Digitech
DMW Group
Doelz Networks
Domain
DSC Communications
DSP Technology
Duquesne Systems
Dynatech Data
EBN Communications
EDA Instruments
EICON Technology
Electrodata
Experdata
Fairchild Data
Farmstead Ielephone Group
FEDEX International Transmission
FiberCom
Fibermux
Fibronics
FOCS
Frederick Engineering
Frequency & Time Systems
Fujitsu America
Gandalf Data
General DataComm
General Instrument
General Instrument, Network Cable Division
Glasgal Communications
Gore & Associates
Government Computer News
Grass Valley Group
GTE Spacenet
Halley Systems
Hard Engineering
Harris
Harris/Lanier
Hayes Microcomputer Products
Hekimian Laboratories
Hewlett-Packard
Hughes Communications
Hughes Network Systems
IBM
IDG Communications
IDACOM Electronics
IEEE Communications Society
iNet Company of America
Infinet
Information Engineering Institute
INFORMER Computer Terminals
Infotron
Integrated Network
Integrated Telecom
International Data Corp.
International Datacasting
International Microwave
Intratec Systems
ISC Datacom
ITT
Jupiter Technology
Kentrox & Wilcom
LAN Magazine
LANEX
Larse
Laser Communications
Laser Precision
Local Data
LP COM
Lucas Semiconductors
Luxcom
M/A-COM MAC
MCI
MCS
Memotec
Metrocast
MetroTel
Micom Systems
Microlog Corp.
Microtronix Systems
Microwave Nebworks
MIS Week
Mod-Tap System
Mohawk Wire & Cable
Motorola
National Telecommunications Network
Navtel
NEC America
Netline Communications
NETRIX
Network Communications
Network Equipment Technologies
Network Systems
Nevada Western
Newark Electronics
Newbridge Networks
North Supply
Northern Telecom
NOVA USA
Nu Data
NYNEX
Octocom Systems
Omnicom
Optelecom
Optical Cable
Optical Data Systems
OST
PA Consulting Group
Pacific Bell
Paradyne
Patton Electronics
PC Week
Penril, Datacomm
Phoenix Microsystems
PictureTel
Pirelli Communication
Plantronics Futurecomms
Progressive Computing
Proteon
Pulsecom Division, Hubbell
Quebec Government
Racal-Milgo
Racal-Vadic
Racon
Rad Data Communications
Raycom Systems
Reliable Electric
Remee Products
Renex
Republic Telcom
Residence Inn
Retix
Rockwell International
RYBS Electronics
Sargent Fiber Optic
SBUE
Scientific Atlanta
Sel-Tronics
Sequel Data Communications
Siecor
Soft-Com
Southwestern Bell
Spectrum Planning
Stonehouse & Co.
Stratacom
Superior Optics
SynOptics Communications
Tau-Tron
Technology Transfer Institute
Tekelec
Telco Research
Telco Systems NAC
Telebyte Technology
Telecom Analysis Systems
Telecom Publishing Group
Tele-Computer Systems
Telecommunications
Telecommunications Techniques
Teleconnect
Telect
Tele-Measurements
Telenex
Telephone Engineer & Management
Telephony
Tele/Scope
Tellabs
TelWatch
3M Corporate Marketing Services
10NET Communications
Thomas & Betts
Timeplex
TPT
Tricomm Services
Trompeter Electronics
TRW
Tymnet McDonnell Douglas
Unidata
Universal Data Systems
US Robotics
US Sprint
US WEST Communications
US WEST Network Systems
Valucom
Verilink
Versa-Lite
Versitron
Vertex
VIR
Vitalink
Wandel & Goltermann
Washington International Teleport
Wegener
Wellfleet
Williams Telecommunications Group
Wiltronix
Wyle Laboratories
XTEND
X25 Systems
Zenith

*As of July 29, 1988

Come to Washington, D.C., and discover the world of communications.

At Communication Networks, you'll meet the players who represent the entire world of voice and data communications technology. And you'll get the information you need to connect *your* organization with the world business community for maximum operating efficiency and productivity.

What's more, CN '89 has been selected by the U.S. Department of Commerce to participate in its elite 1989 Foreign Buyer Program. So you'll have a unique opportunity to learn and share ideas with other professionals like you from around the world.

Join these decision-makers with the same responsibilities, goals and priorities as you:

- ☐ Upper-level managers who want to improve their communications/network-management capabilities
- ☐ Corporate telecommunications and network managers/directors
- ☐ Sales/marketing executives and managers
- ☐ Distributors of communications products/services
- ☐ Communications systems managers/designers
- ☐ Communications planning managers
- ☐ Communications analysts/specialists/programmers/technicians
- ☐ DP/software engineers/managers
- ☐ Systems engineers/engineering managers
- ☐ Product-development/business-planning managers
- ☐ Operations maintenance and installation supervisors/managers
- ☐ Government officials and communications policy makers
- ☐ Consultants

Explore the possibilities, the issues and the solutions that will shape your decision making.

In three intensive days, you'll have your choice of 18 in-depth tutorials and 80 conference seminars covering important subjects, such as:

- ☐ What's new in very large LANS; ISDN; network planning, design and security; and evolving voice and data communications technologies
- ☐ How the new Administration's regulatory and policy decisions will affect your business
- ☐ Which network management technologies may change your long-term planning
- ☐ How to successfully implement multi-vendor communications and achieve true connectivity
- ☐ Plus dozens of other hot topics you want to know more about.

Find out more about Communication Networks... and win!

Plan now to attend CN '89. See the products and systems that will determine how you conduct business for decades to come...and make you a winner. All under one roof. *And see inside for details on how to win it all as part of our exciting "See The Communications World" contest.*

The 11th Annual Communication Networks Conference & Exposition

Answering the challenge
in a changing world.

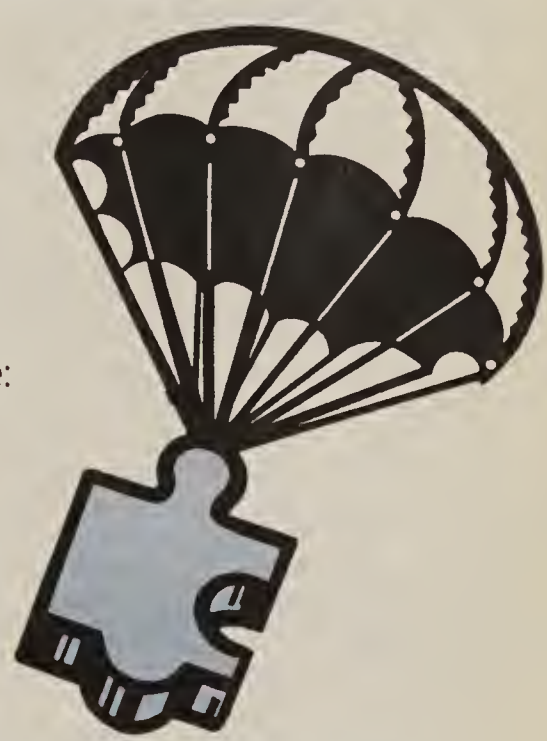
Washington, D.C.
February 6-8, 1989

Inside is just your introduction.
Learn more, and you may win it all.

The 'new' IBM:

Find out how the pieces are falling into place.

Computerworld Extra on IBM
Issue Date: November 16 Ad Close: October 14



Despite growing challenges, IBM is still the industry leader. And after 1987 saw a year of promises from Big Blue, 1988 brought a year of reorganization in an effort to fulfill those promises.

On November 16, *Computerworld Extra*, a special publication from *Computerworld*, will take a close look at that reorganization. It will focus on the products and directions that Big Blue announced during the last 12 months—and reveal how users have reacted to them. It's an important story, and one you won't want to miss!

Computerworld Extra will look closely at IBM's reorganization with planned topics like:

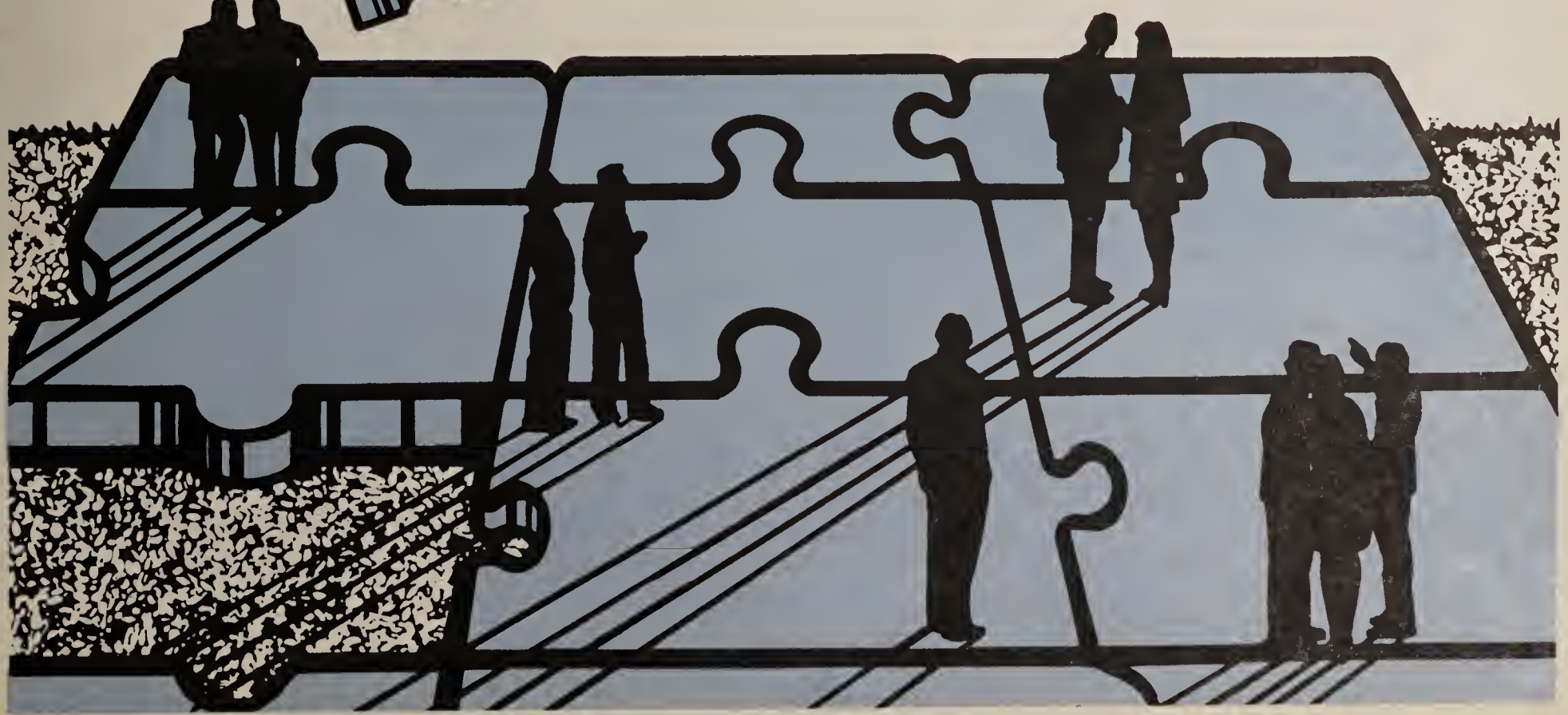
- **IBM's new mainframe strategy.** Experts believe the company must reposition the mainframe as a database machine and network hub. We'll look at new and future mainframe technology from Big Blue.
- **A beefed up software front.** Two new software-only divisions should make IBM an even greater force in the applications market. Here's a look at the strategies and likelihood of success for these new segments.
- **The perils of reorganization.** We'll examine the effects of a radical restructuring—including the redeployment of thousands of employees from the factory to the field.
- **The new 'team approach.'** We'll look at the success of IBM's new Information Systems Investment Strategies (ISIS) in increasing user computer investments.

You'll also get your questions answered by IBM executives in our *Ask IBM* feature. Plus, you'll get a close-up look at Big Blue's new marketing leadership and much more.

And if you market products or services in the IBM arena, your ad in *Computerworld Extra* can help your marketing efforts fall into place. You'll reach over 620,000 information systems professionals just as they're getting the story on IBM. And with bonus distribution at Comdex Fall, your advertising message will reach thousands of show attendees! Closing date is October 14, so call Val Landi, Vice President/Associate Publisher, or your *Computerworld* sales representative to reserve your space today.

COMPUTERWORLD *Extra*

An IDG Communications Publication



Barney

FROM PAGE 45

back in 1985. Unfortunately, Compaq and others rejected the notion, preferring to wait for IBM's next move, which turned out to be the Micro Channel.

But Compaq, which doesn't particularly like Phoenix, says that the read-only memory BIOS king had almost nothing to do with EISA. That aside, you've got to wonder how these competing personal computer vendors will cooperate and get EISA finished in the first place, given that the PC ET fell apart because of squabbling.

Compaq Vice-President Mike Swavely says a common goal will keep them together and that EISA learned a lesson from the immature handling of the PC ET proposal.

Still, it is a bit reminiscent of a man who gets divorced because he fought with his wife. After getting remarried, he pledges not to fight with his new wife. Go visit that guy and guess what you'll find him doing — fighting with his new wife!

Why an AT? Ever wonder why Lotus now recommends a "Lotus-certified" compatible PC with an Intel 80286 processor or better to run 1-2-3 Release 3.0? I did, and now I think I know the answer.

Like the latest version of Microsoft's Windows, Release 3.0 apparently uses a special trick to free up some space by hiding 64K bytes of code. The thing is, for this to work, the PC has to have 1M byte of RAM divided into 512K-byte sets on the motherboard, which only the more recent IBM Personal Computer AT clones have.

It's going to cost them how much? Lotus' free Release 3.0 upgrade for current Release 2.01 customers does not come cheap — at least for Lotus. If you do the math, it costs Lotus a bundle. If we assume worldwide sales of 100,000 per month, with half of these users planning to upgrade, Lotus will miss out on $7.5 million per month. If we simply look at the U.S. market in which, say, 60,000 are sold per month, Lotus still loses out on $4.5 million. Don't feel too bad, though. Lotus is still creeping steadily toward the half-billion dollar mark.

No demotion around here. When Microsoft reorganized its applications group, some observers said that former head of applications marketing Jeff Raikes was the loser. Instead of heading up marketing of all applications, Raikes got word processing and some nebulous office automation.

What these observers failed to see, points out a Microsoft marketeer, is that Raikes actually gained responsibility. Instead of managing 60 people, Raikes now manages 140. And instead of just having marketing types reporting to him, Raikes has full control of programming, documentation, testing, etc. So instead of consolation, we offer congratulations.

We're confused. We're schizophrenic. We're Microsoft! No, Microsoft does not have a major personality disorder. It does, however, have a mixed view of Lotus' 1-2-3 Release 3.0, which will run under Microsoft's MS-DOS and OS/2.

A guy from Microsoft interested in the success of OS/2 told me to be nice to Lotus. "We need Release 3.0 to succeed for OS/2," he said. Then he also said nice things like "Release 3.0 is a great product."

But someone else from the applications side of Microsoft said curtly, "We don't want Release 3.0 to do well." Jeepers. Wonder what Bill Gates thinks?

Becoming more cooperative: If you're sick of all this stuff about 1-2-3 Release 3.0, skip this item. If not, read on.

In all the hullabaloo over Release 3.0's three-dimensional spreadsheets, we've missed one important point that Lotus itself has failed to articulate. Because the Release 3.0 core will eventually run on everything from IBM 370s to Unix workstations to Macintoshes, it can usher in a new era of cooperative processing.

Forget all about that silly 640K-byte limit. Instead, we can use the PC as the front end and those butt-kicking IBM mainframes as spreadsheet engines for serious crunching.

This is particularly handy for huge consolidated worksheets, but it also points out the need for improved auditing techniques. Just imagine some of the PC spreadsheet nightmares amplified on an IBM 3090. Ouch!

But first we need Release 3.0. And you know what they say: In a few million years, the sun will implode and completely burn out, which means that Lotus will have to finish Release 3.0 in the dark.

Barney is a *Computerworld* senior editor, microcomputing.

Price hike

FROM PAGE 45

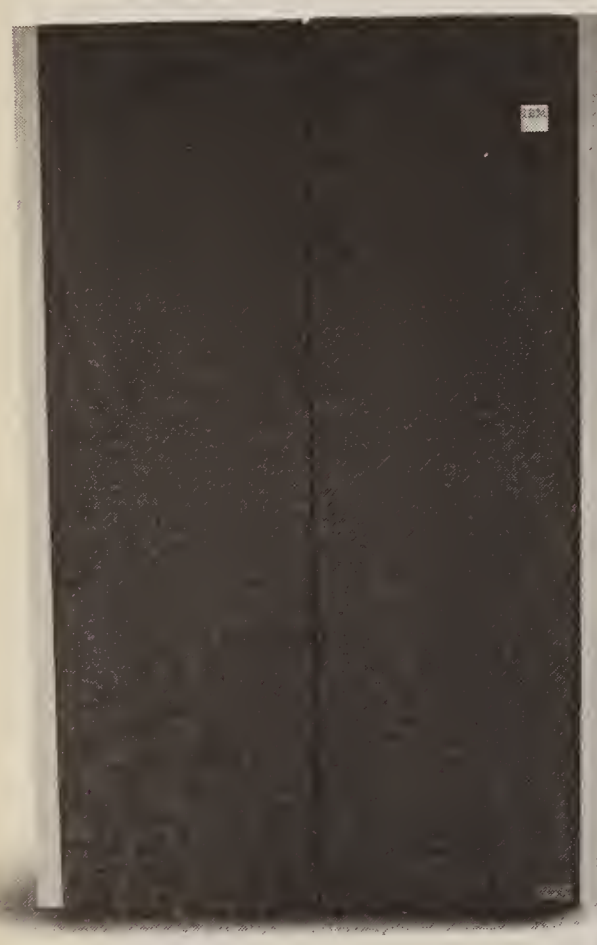
the six that make up Hughes — to consider alternatives, notably IBM's Personal System/2. Of Ground Systems' 5,000 PCs, 60% to 70% are Macintoshes.

Apple is taking advantage of the Mac's growing popularity among corporations to boost revenue, Howlett said. "They won't get away with it," she said. "They have to remain competitive."

Tim Turnpaugh, a vice-president at Seafirst Corp., a Bankamerica Corp. subsidiary, said the increase may cause fewer Mac purchases. "The more something costs, the less you can have of it," he said. "We have the same amount of dollars to work with; that's fixed."

Peat, Marwick, Mitchell & Co.'s partner in charge of audit technology, Dick Webb, said his firm is in the process of upgrading its current Macintoshes with more RAM. Some branch offices will likely wait to purchase memory upgrade kits until prices come down.

"The timing was the most disturbing thing about this," Webb said. "There was absolutely no inkling that it was coming. We couldn't plan ahead."



A lot of companies can put a PC and mainframe on speaking terms.

Complete connectivity. A lot of software companies talk about it. Rabbit is doing it. With high-performance products that connect single workstations and LANs into today's networks. And by helping companies evolve into SAA enterprise-wide networks.
PC/Mainframe solutions: RabbitSTATION Coax and RabbitSTATION DFT provide coaxial access to mainframe data from your PC or PS/2 via 3270 emulation. RabbitSTATION Remote provides remote mainframe access for PCs without using costly IBM controllers. All use less PC memory and provide file transfers up to 50% faster than the competition.
LAN gateway solutions: RabbitGATE II gateways enable your NETBIOS and Novell IPX LAN workstations to simultaneously share mainframe resources using multiple protocols and options at transfer rates up to 56 Kbs.
Existing 3270 devices solutions: RabbitCLUSTER gives your PCs the capa-

© 1988 Rabbit Software Corp.

NEW PRODUCTS

Systems

Redline Computers, Inc. has announced the **Data Cell** CPU platform. The product will transform most commercially available Intel Corp. 80286- and 80386-based microcomputers into a multiuser system server, network file server or engineering workstation, the vendor said.

The caster-wheeled tower unit features a built-in uninterruptible power supply, extra drive bays, data switches and a filtered power supply. The product is expandable to as much as 3G bytes of on-line disk storage and allows the physical separation of the CPU and disk drives. Dual four-way data switches share I/O data between eight peripheral devices.

The Data Cell is priced at approximately $3,995, depending on configuration.

Redline Computers, 7924 Miramar Road, San Diego, Calif. 92126. 619-566-3883.

Advanced Logic Research, Inc. has unveiled two 25-MHz Intel Corp. 80386-based microcomputer systems.

Designated the **ALR Flexcache 25836DT**, the **Model R66** and **Model 100** have 66M and 100M bytes of fixed-disk storage, respectively. Both units feature a zero-wait state processor and a high-performance controller with full-track buffering and 1-to-1 interleaving, the vendor said. The machines also include a 101-key enhanced keyboard and one serial and one parallel port. Memory is expandable to 14M bytes with an optional expansion card.

The ALR Flexcache 25836DT Model R66 costs $6,490. The Model 100 is priced at $6,990.

Advanced Logic Research, 9401 Jeronimo Drive, Irvine, Calif. 92718. 714-581-6770.

Software applications packages

An integrated software package for MIS resource management has been introduced by **P-Cube Corp.** Called **Opportunities+/IRM**, the product reportedly will aid MIS professionals in planning, project definition, analysis, prioritization and performance evaluation.

The software is based on an analytical model that measures the quality of information support in an organization; it includes a well-defined set of metrics, the anticipated contribution of proposed and existing projects. The system also measures the degree to which completed projects have fulfilled expectations. An IBM Personal Computer AT with a minimum of 512K bytes of memory is required for operation.

Opportunities+/IRM costs $9,500, which includes training expenses.

P-Cube Corp., 915 Kings Canyon Rd., Brea, Calif. 92621. 714-990-3169.

Software utilities

Peter Norton Computing, Inc. has announced an upgrade of its DOS enhancement and file manager for IBM Personal Computers.

Norton Commander 2.0 is said to feature built-in Lotus Development Corp. 1-2-3 and Ashton-Tate Corp. Dbase viewers, which allows users to browse 1-2-3 and Dbase files directly from Commander. The product also offers a pull-down menu interface and requires DOS 2.0 or higher for operation.

The Norton Commander 2.0 costs $89.

Peter Norton Computing, Suite 186, 2210 Wilshire Blvd., Santa Monica, Calif. 90403. 213-453-2361.

Macintosh products

360 Microsystems has introduced two software packages designed specifically for programmers of Apple Computer, Inc.'s IIGS microcomputer.

File Utilities I is a set of 14 commands that can be easily installed in the user's command shell, the vendor said.

The product incorporates APW/ORCA command standards and comes in a 3½-in. disk format. File Utilities I costs $34.95, including a 30-page manual.

The **360 Text Tool Kit** was developed to provide programmers with text screen-manipulation capabilities. The program consists of a set of library routines that eliminate the need for creating a sophisticated user interface. All functions can reportedly be linked to any language based on APW/ORCA.

The 360 Text Tool Kit costs $49.95 and includes a 3½-in. disk and 200-page manual.

360 Microsystems, 12272 Fox Hound Lane, Orlando, Fla. 32826. 407-275-6418.

Peripherals

Perstor Systems, Inc. has announced three additions to its line of Perstor 200 Series Advanced Data Recording Technology controllers.

The **PS180-16F, PS200-16F** and **PS180-16FHP** are combination floppy- and hard-disk controllers for Intel Corp. 80286- and 80386-based microcomputers with speeds up to 25 MHz.

All are reportedly port-address- and register-set-compatible with the IBM Personal Computer AT controller.

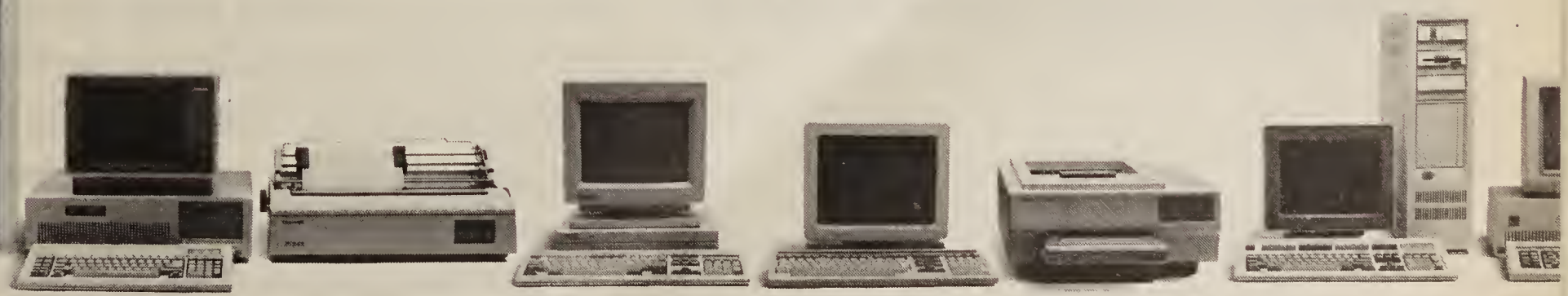
Each unit is said to include a 16-bit bus, dual random-access memory, zero-wait state transfer and an on-board BIOS that supports a variety of hard disk tape drives.

The PS180-16FHP also includes a BIOS-resident cache that runs in any selectable combination of normal internal memory, Lotus/Intel/Microsoft Expanded Memory Specification or AT extended memory.

The PS180-16F costs $345, the PS180-16FHP costs $375, and the PS200-16F sells for $365.

Perstor Systems, 7631 E. Greenway Road, Scottsdale, Ariz. 85260. 602-991-5451.

Rabbit has them all talking.



bilities of an IBM 3274 controller *plus* ASCII device connectivity in one device. At a fraction of the cost. And without affecting your host PC's performance.

386 UNIX/XENIX solutions: RabbitPLUS 386 products let 386 PCs access IBM mainframe resources while maintaining your 386 PC's processing power. No matter what SNA or BSC connectivity application you need—including 3270, RJE, APPC, SNADS and DIA.

So if you're looking for connectivity solutions, talk to the people who have them all talking. Call 1-800-RABBITC (outside U.S. 215-647-0440). Or write: Rabbit Software Corporation, Seven Great Valley Parkway East, Malvern, PA 19355.

Rabbit SOFTWARE

We've got them all talking™

Is it Safe?

North Africa...U.S. paratroopers on the way to their next mission. (Credit: International News Photos)

Would You Like to Know a Way to Make Risk-free Decisions About Buying Mainframe Software?

Buy from On·Line Software—the safe buy in mainframe software.

On·Line Software is "the safe buy" because it's the first and only company to offer you a lifetime guarantee that the money you spend with us today will still be available to meet your changing needs tomorrow.

No more waiting on vendors' promises for the ultimate solution—take advantage of today's technology today! IBM® and others may be addressing the "big picture" of tomorrow, but

IBM is a registered trademark of International Business Machines.

The Guarantee.

Any time your technical or business needs change and you can no longer use one of our products—or even if you just decide you don't want it anymore—you can simply send it back. We will give you full credit for every dollar of your original license fee toward any other On-Line Software product. All products licensed and maintained under our standard contracts come with this trade-in guarantee.

our software solves your problems today. It's simple. If tomorrow's solutions make today's problems obsolete, send us back our software and trade it in for any other product we offer. And while other vendors develop their solutions, you will be benefiting from the use of ours.

Let's say you migrate from IMS to DB2. Simply trade in our IMS tools for our new DB2 tools. It's as if you could suddenly trade in all your records for compact discs! And, of course, you'll have our broad array of software products to choose from.

In fact, only two companies—IBM and Computer Associates—offer a wider range of IBM mainframe software than we do; but neither one has our products, nor offers a similar guarantee.

It's like a lifetime trial. Think about it! Any reputable software vendor will offer you a 30-day free trial and a guarantee that the software will perform as expected. But what we are offering you is more. Our guarantee is our promise to you that our software will always be state-of-the-art, and that we'll work so hard to please you that you'll never have a reason to return an On-Line Software product.

So the next time you are evaluating software for your company, ask yourself the question, "Is it safe?" We can't guarantee that technology won't change, but we can guarantee you the purchasing power to change with technology. And we feel safe in making that statement, simply because our software is that good! Just think. If we didn't have complete confidence in our products, would we make this kind of guarantee?

For "the safe buy" in software, call 1-800-642-0177. In Canada, call 201-592-0009.

On-Line Software
INTERNATIONAL

The Safe Buy in Software.

"Our network moves enormous loads quickly. So does our CICS."

"At CSX, we have 61 production CICS regions and seven million transactions per day. With The Monitor For CICS,™ we see problems long before our users do."

Rail transportation. Container shipping. Gas pipelines. Resorts. CSX is a $13 billion giant. With over 21,000 miles of rail, 6,000 miles of natural gas pipeline, and 5,000 miles of fiber optics, CSX needs real-time status to service its customers.

So at their Jacksonville, Florida, and Baltimore, Maryland, facilities, CSX uses CICS to track status and inventory—and relies on The Monitor For CICS to manage CICS performance. "The Supertrace feature lets us look inside an application and gauge its effects on system performance," says **Jason Butler, Manager, Technical Services.** "We can trace application logic and evaluate resource consumption right down to the event level."

"We've built a unique monitoring system that is PC-based and set up so that Monitor commands are automatically executed to identify poor response times. This lets me spend more time with features such as the storage display. Now when a problem arises in CICS, I can alter storage or delete ICE/AID chains rather than shutting down and cold starting the system."

The Monitor is the *complete* CICS performance management system that'll help you save the day. Become the hero in your CICS community! For a *free, 30-day trial* of The Monitor For CICS, call us today at **1-800-227-8911** or 1-703-893-9046.

LANDMARK™

THE MONITOR® FOR CICS

MINDS YOUR BUSINESS

Landmark Systems Corporation
8000 Towers Crescent Drive, Vienna, Virginia 22180-2700

DATA STREAM

Fred Barrett

Come on, get HLLAPI

More and more corporations are finding dumb terminal emulation an unsatisfactory way to provide users' stand-alone personal computers with access to crucial mainframe resources. For one thing, it requires training users in mainframe operation.

One possible solution to this problem is the development of intelligent workstations. Two tools that IBM provides to do this are High-Level Language Application Program Interface (HLLAPI) and Advanced Program-to-Program Communications (APPC). Let's examine and compare them.

HLLAPI is a set of callable functions that emulate terminal user operations. Menu-driven programs can be written in high-level languages such as C and Pascal, which use HLLAPI functions to log on to mainframe systems, retrieve data and send data without user intervention. HLLAPI is not a communications protocol but rather an interface to terminal emulation software. The advantage to corporate developers of an industry-standard interface is that one application can be created that will function across a diverse installed base of terminal emulation products.

HLLAPI applications can access any system or environment that an IBM 3270 terminal user can access without having to

Continued on page 62

Transmission spending sinking

BY ELISABETH HORWITT
CW STAFF

ELLICOTT CITY, Md. — Large firms will spend more on network management and data compression and less on data transmission equipment during the next two years, according to a recent report by Newton-Evans Research Co.

In a survey of 100 companies that either are in the Fortune 500 or have at least $100 million in revenue, Newton-Evans found that the percentage of data communications budgets spent on data transmission will fall from 39% this year to 36% in 1990.

Conversely, respondents will spend roughly 41% of the budget on data compression equipment in 1990, compared with 40% this year, and 23% on network management systems in 1990, compared with 22% in 1988.

The respondents represented a mix of industry sectors: retail/wholesale, public utilities, financial, manufacturing and transportation, the research firm said.

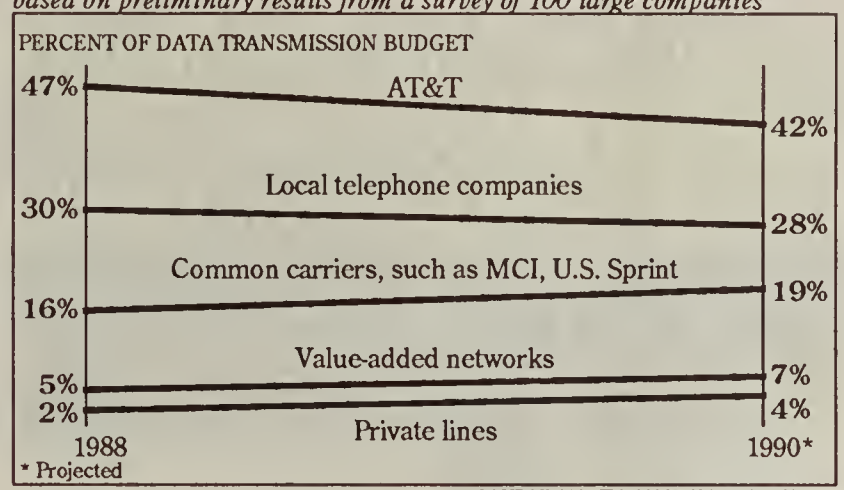
The results show that "American companies are maturing in their use of data communications and are moving toward managing their networks more effectively," said the research company's president, Chuck Newton.

Many firms have already installed the basic transmission

Continued on page 62

Breakdown of data transmission budgets

AT&T, local telephone companies are losing to cut-rate competition, based on preliminary results from a survey of 100 large companies



SOURCE: NEWTON-EVANS RESEARCH CO.
CW CHART

IBM adds T1 net manager

First joint development products released

BY ELISABETH HORWITT
CW STAFF

NEW YORK — IBM has finally come out with a network management system for its resold line of Network Equipment Technologies, Inc. (NET) T1 switches, but it has not yet provided real integrated management of Systems Network Architecture (SNA) applications and T1 physical connections, industry sources said.

On the other hand, the graphics-based, mouse-driven, windowed workstation may be a harbinger of similar enhancements of IBM's own Netview network management system.

The first fruit of IBM's joint development agreement with NET, the Transmission Network Manager embodies NET's existing graphics-based workstation product on IBM's Personal System/2 running its OS/2 Extended Edition, IBM said. IBM has added a variety of features to the product, including an SQL-based database and bidirectional communication with Netview via Netview/PC, IBM spokesman Charles Shiverick said.

Stands alone

The system can act as a stand-alone network management workstation, collecting network statistics as well as real-time alerts and alarms from NET Integrated Digital Network Exchange (IDNX) T1 switches and allowing the user to send reconfiguration commands to the network, IBM said. It also provides the same management capabilities via a Netview host, according to IBM spokesman Robert Anderson. The user can also program IDNX switches through the Netview-to-Netview/PC interface to initiate tests or reconfigure lines at a given time of day, Anderson said.

However, Transmission Network Manager does not provide the close integration between logical SNA applications and physical links that some users are demanding, according to David Passmore, a principal at Network Strategies, Inc. in Fairfax,

Continued on page 60

16M-bit Token-Ring delayed

BY PATRICIA KEEFE
CW STAFF

NEW YORK — Whither IBM's 16M bit/sec. Token-Ring?

Despite rampant industry speculation to the contrary, it was nowhere to be found among the 55-product avalanche unleashed by IBM at a press conference here two weeks ago. That is because it is still undergoing internal testing, according to Ellen Hancock, an IBM vice-president and general manager of IBM's Communications Products Division.

Specifically, IBM is working on connectivity issues in products that would attach to the 16M bit/sec. card, she explained. Industry analysts have said that the I/O ports on IBM's 9370, Application System/400 and some mainframes currently will only handle 4M bit/sec. data transmission.

Given that the 16M-bit Token Ring was demonstrated as early as January and is said to be up and running at some IBM sites in Europe, there may be other reasons behind the absence of the reticent sibling of the current 4M-bit Token Ring.

The most likely involves Tex-

Continued on page 61

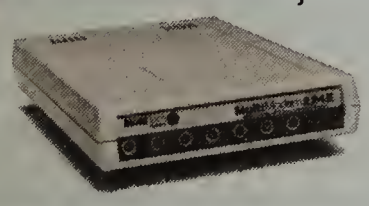
Inside

- More on IBM's connectivity announcements. Page 60.
- Start-up plans fiber-optic net for Boston's tech region. Page 61.
- DCA tool gives PC users access to mainframe graphics. Page 63.

Modems, Multiplexers, and Much More...

Warning: Bargains can be hazardous to your network.

Some people feel that price is the only thing that matters when it comes to modems. Our customers feel differently. If you also feel that quality, support and company stability are just as important as price, we offer you our 2400/1200 bps error-correcting MultiModems,™ in desktop, internal PC and rack-mounted versions. And if your network is ready for multiplexing, we offer our MultiMux™ 4- and 8-channel statistical multiplexers.



MultiModems and MultiMuxes are manufactured in Minnesota by Multi-Tech Systems (as they have been since 1970), and provide exceptional quality at an economic price. If you are not already a Multi-Tech modem or mux user, please call us toll-free today, at

1-800-328-9717.

MultiTech Systems

Multi-Tech Systems, Inc. • 82 Second Avenue S.E. • New Brighton, MN 55112 • (612) 631-3550 • (800) 328-9717 • FAX 612-631-3575 • TWX 910-563-3610

IBM unleashes connectivity products

BY ELISABETH HORWITT
and PATRICIA KEEFE
CW STAFF

NEW YORK — While Netview enhancements and support of the Open Systems Interconnect (OSI) standard stood out among IBM's recent slew of connectivity introductions, the vendor also made key announcements in other connectivity areas and network management.

Among the many strategic IBM unveilings was Release 2 of Network Distribution Manager, which provides a mechanism for distributing software from a central mainframe out to a variety of devices. The new release introduces IBM Personal Computer support, which should be a boon to companies such as insurance firms that "need to frequently update tables for thousands of agents" on PCs, IBM spokesman Robert Anderson said.

Release 2 also allows users to distribute microcode to 3174s. This method "sure beats mailing floppies" for companies that need to reconfigure 3174s at hundreds of remote sites, said David Passmore, a principal at Network Strategies, Inc.

In addition to widening its OSI support, IBM introduced MVS support for Transmission Control Protocol/Internet Protocol (TCP/IP) in response to growing TCP/IP demand that has even leaked into the vendor's commercial accounts, according to Ellen Hancock, general manager of IBM's Communications Products Division. However, Gartner Group, Inc. analyst Steve Windler suggested that IBM covets the scientific, engineering and government markets, all of which are heavy users of TCP/IP.

"We are observing a general, subtle shift in the Fortune 1,000 to TCP/IP," said George Colony, president of Forrester Research, Inc. in Cambridge, Mass. He said many users have decided to go with TCP/IP for the next three or four years before shifting over to OSI.

> "WE ARE observing a general, subtle shift in the Fortune 1,000 to TCP/IP."
>
> GEORGE COLONY
> FORRESTER RESEARCH

IBM also announced support of Common Management Information Protocol, an application-to-application communications protocol that is slated for use by both OSI and TCP/IP network management systems. The vendor has yet to announce support for Simple Network Management Protocol (SNMP), the current TCP/IP network management protocol.

However, Frank Dzubeck, president of Communications Network Architects, Inc. in Washington, D.C., predicted that IBM might rectify that oversight with an announcement this week at the Interop 88 TCP/IP trade show in Santa Clara, Calif. IBM already has SNMP running on the National Science Foundation's NSF Net, he added.

If You Could Input Anything Into Your Computer Instantly, Without Using The Keyboard, Would It Make Your Life Easier?

Introducing DeskScan 2000. The affordable scanner from Chinon.

Chinon's unique new scanner could change forever the way you use your computer. With OCR software, it scans, digitizes and inputs text into your computer so that you can edit it with almost any word processing software. That means no more retyping of documents. Just think how much time that could save you and your staff!

DeskScan 2000 also scans images, so that you can input graphics too. Then you can manipulate these images with desktop publishing or graphics software.

Best of all, DeskScan 2000 is much lower priced than most effective scanners. That means it's finally cost-effective to put a scanner on every PC user's desk.

DeskScan's unique overhead scanning design means that you no longer have to separate pages from documents to feed them through a scanner. The document stays still while the scanning head *"reads"* the page. And the unit automatically adjusts for room lighting levels.

Scanners aren't just for desktop publishing any more. DeskScan 2000 becomes an economical FAX, with the simple addition of an inexpensive add-in board. Chinon sells this exciting option and others in package combinations of bundled hardware and software—so that you have an affordable way of getting started with your scanner right away.

So see for yourself what DeskScan 2000 can do for you. Call TOLL-FREE 1-800-441-0222 TODAY for the DeskScan 2000 dealer nearest you.

CHINON

Chinon America, Inc., 660 Maple Ave., Torrance, CA 90503

T1 net manager

CONTINUED FROM PAGE 59

Va. "There is still no awareness of SNA sessions or virtual routes," he added.

This capability is sadly missed by companies such as Sears Communications Co., which wants its NET-based SNA network to be able to correlate alerts generated by IDNX with the SNA resources that are logically using those facilities, according to Gary Weis, a vice-president at the Sears, Roebuck & Co. subsidiary. "In today's environment, if you lose a T1 link between two IDNXs, the SNA world doesn't know [what happened to] the 10 or 15 logical SNA links that are going over that physical link," Weis said. While the announcement is "a step in the right direction," the partnership still has a way to go, he added.

Getting friendlier?

Transmission Network Manager currently uses a windowing interface based on an internal IBM product that is not offered commercially, Shiverick said. The graphics feature is provided by a third-party vendor under contract to IBM. However, vendor spokesmen have indicated that friendlier user interface features such as graphics are in the works for Netview.

IBM plans to migrate Transmission Network Manager's user interface to IBM and Microsoft Corp.'s Presentation Manager after the code becomes available, Shiverick indicated. Transmission Network Manager, along with future IBM network management products, will incorporate Systems Application Architecture components whenever possible, he added.

Pricing for Transmission Network Manager is $20,000 or more, depending on the number of T1 nodes supported. The product will be available exclusively from IBM, with a scheduled release date of June 1989.

Token-Ring

FROM PAGE 59

as Instruments, Inc. and its efforts to redesign the current token-ring chip set. TI recently canceled a scheduled press tour to discuss plans to unveil a reduced chip set for the 4M-bit network this month. The new design requires fewer chips and will lead to lower costs for manufacturers and, thus, for users, a TI spokeswoman said.

But a source close to IBM questioned whether TI would come out with a new 4M-bit chip set if IBM was about to introduce a 16M-bit card. Moreover, this source cited reports that TI is working on a single chip set that will support 4M- and 16M-bit speeds and suggested IBM may have delayed the introduction of its adapter to take advantage of this dual-mode capability.

"If you think back to the introduction of the original Token-Ring, IBM announced that TI would make these chips available to competitors so they could develop compatible networks," the source said. "If IBM was about to come out with a 16M-bit card, would TI come out with a chip set that only ran at 4M bit/sec.?"

IBM's Hancock did briefly refer to a "different chip design to accommodate the [increased] speed" as one reason for the delay.

"Our position is that we'll announce it later this year," Hancock said.

Some pundits predict an unveiling during the week prior to the next major trade show in 1988, Comdex/Fall. Also slated for November delivery is IBM's LAN Server software, announced at Comdex/Fall '87.

Once unveiled, IBM intends to market the 16M-bit network as a gateway product, Hancock said. Echoing comments from users [CW, Sept. 12], Hancock said the 4M-bit network "is pretty robust by itself." She characterized the 16M-bit version as more of a gateway product for moving huge volumes of data, citing scientific and engineering work loads as examples. "This is where [100M-bit Fiber Distributed Data Interface] is looked at, also," Hancock said.

She said that users are most likely to leapfrog directly from 16M bit/sec. to 100M bit/sec., and she expressed doubts that the market would see products supporting in-between speeds such as 50M or 60M bit/sec. "I think there will be a place for each one [4M, 16M and 100M bit/sec.] for quite some period of time," she added.

Start-up is third firm in fiber network fray

BY ELISABETH HORWITT
CW STAFF

BOSTON — A third company has announced plans to offer fiber-optic-based communications for greater Boston businesses. Teleport Boston Corp., a 1987 start-up, recently said it will build a 100-mile fiber-based network that will provide regional firms with local connections and links to interstate carriers and other parts of the world via a satellite link.

The company said it plans a fiber network that runs west from Boston out to the high-tech region of Route 128 and north to Burlington. The service will specialize in high-volume voice, data and video transmissions at rates of 1.5M and 45M bit/sec., the vendor said. Pricing will be 10% less than comparable services, according to Teleport Boston President Bradley Youngman.

The newest entry in Boston's bypass market will be going head-to-head with two other contestants: regional carrier New England Telephone Co. and an earlier start-up, Teleport Communications Boston (TCB). Teleport Boston said it plans to differentiate itself from the competition by offering a teleport satellite facility west of Boston that will provide area businesses with voice, data, and video communications to sites around the world, Youngman said.

The company is talking with the Massachusetts Office of Investment and International Trade about using the teleport facility to stimulate trade between Massachusetts and India, Youngman said. For example, Indian hospitals could use the satellite link to transmit X-ray photos to Boston for diagnosis by local hospitals that have more sophisticated equipment.

Reactions

Teleport Boston's potential competitors have not been idle. Anticipating market demand for a higher capacity, lower cost, more reliable medium than copper cabling, New England Telephone began laying down fiber in the Boston area in 1986, according to company spokesman Mark Marchand. The Bell operating company's fiber-based facilities, which went into operation last spring, currently connect more than 130 buildings in downtown Boston, he said.

The company has 67,000 fiber miles in place throughout the state, with a heavy concentration in the Route 128 area. "This sort of competition has become a fact of life in the telecommunications market, and we already have a network in place to compete vigorously with systems like these," Marchand said.

Teleport Boston's plan is "very ambitious in terms of mileage in a relatively short time," said Paul Chisolm, general manager of TCB. TCB's construction plans are currently limited to downtown Boston, although the company is considering a loop out to Route 128, Chisolm said. "We've already proven we can do [a fiber-based metropolitan-area network]," he added. TCB is a joint venture whose partners are Fidelity Communications, Inc. and Merrill Lynch Teleport Technologies, Inc., which constructed a similar network in New York.

TCB initially planned to begin network operations in Boston's financial district by the middle of this year, but now it hopes to initiate service in January, Chisholm said. Teleport Boston said it plans to start installation early in 1989 and initiate service by mid-year.

SNA ⟷ DECnet

WHEN THEY GET ALONG, YOU'VE GOT IT MADE!

When your SNA networks communicate with your DECnet™ networks, your whole enterprise benefits. Interlink's Software Network Solution/SNA Gateway™ (SNS/SNA Gateway™) family is your connectivity solution for SNA and DECnet.

The SNS/SNA Gateway family permits your SNA corporate communications backbone to be a vehicle for DECnet connectivity. With it, DECnet networks can route communications to each other over the IBM SNA network. And systems in a SNA network can participate in a DECnet network. With the SNS/SNA Gateway family, information goes both ways.

In addition to SNA routing, the SNS/SNA Gateway family includes an APPC/LU6.2 programmer's interface. It allows you to develop common application programs using IBM's strategic program-to-program interface. You save time and money by developing transportable applications between IBM and DEC.

Need to centralize your network management? Our NetView interface lets you do just that. Through NetView and over SNA. With one network management environment you can better control your network resources whether they reside on the SNA network or connected DECnet networks.

Increased network communications at all levels, efficient use of computing resources, and time-saving information transfer are some of the benefits of other SNS Gateway family functions.

By minimizing duplication and combining the inherent strengths of each network, Interlink's SNS/SNA Gateway allows enterprises to capitalize on the capabilities of its people and computers.

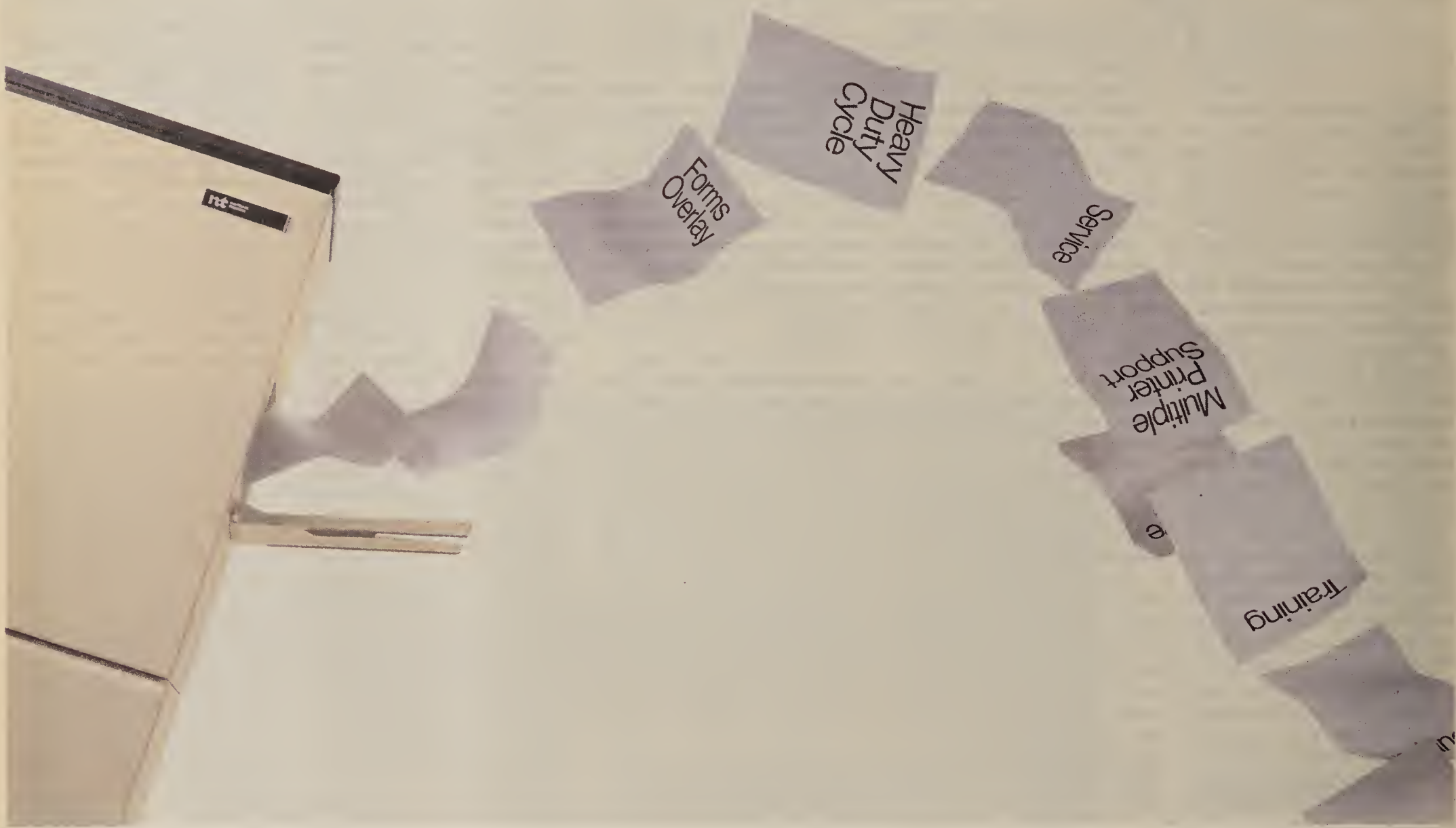
For your free SNS product catalog, call (800) 422-3711 or (415) 657-9800. Or write the address below.

When SNA and DECnet get along, you've got it made.

INTERLINK
Computer Sciences

47370 Fremont Boulevard
Fremont, California 94538

Trademarks: SNS/SNA Gateway is a trademark of Interlink Computer Sciences, Inc. APPC/LU6.2, NetView, and RSCS/NJE are trademarks of International Business Machines Corp. IBM is a registered trademark of International Business Machines Corp. DECnet is a trademark of Digital Equipment Corp.



Fast net bows from Ultra

BY PATRICIA KEEFE
CW STAFF

SAN JOSE, Calif. — A 1G bit/sec. network unveiled recently by Ultra Network Technologies, Inc. reportedly makes use of more than 50% of the available bandwidth of any high-speed host's I/O subsystem. In comparison, typical networks only use 12% to 15% of a host channel's capacity, the company said.

Ultra Network Systems (Ultranet) was designed to attack bottlenecks in high-performance distributed computing environments. It achieves its results through a combination of fiber-optic cabling and customized chips that offload network protocol processing from host software, said Rex Cardinale, Ultra's vice-president of engineering.

Ultranet reportedly minimizes the impact of network overhead and protocol translation activities that can hog bandwidth, limit throughput and create bottlenecks, particularly on high-speed channel-based networks, Cardinale said.

For example, Ultra said that when connecting to Cray Research, Inc.'s 100M byte/sec. HSX channel, its Ultranet reportedly can pass data in excess of 50M byte/sec.

The network is said to support a range of systems, including those from Cray, Convex Computer Corp., Alliant Computer Systems Corp., Sun Microsystems, Inc. and Silicon Graphics, Inc. Ultra software includes support for both the International Standards Organization Open Systems Interconnect model up through the transport level and Transmission Control Protocol/Internet Protocol. Gateways to popular networks such as Ethernet are provided.

Ultranet's hub-oriented topology links to other hubs and to host computers. There are three hubs, each optimized for a specific performance range of hosts.

Connection costs for both hubs range from $8,000 to $75,000, depending on the host computer connection.

The Ultranet Cluster reportedly networks workstations and file servers at rates of at least 7M byte/sec. and provides effective throughput of at least 4M byte/sec. For four or eight workstations, this hub costs $49,000 and $79,000, respectively.

Barrett

FROM PAGE 59

modify a single line of mainframe code. The high-level languages in which these applications are developed make them simple to create and maintain.

HLLAPI will have potential application as long as there is mainframe software utilizing 3270 protocols. IBM has indicated that OS/2 Extended Edition will support a version of HLLAPI this year; many other vendors plan or have support.

APPC is also an application program interface (API). It is a standard set of verbs that allows two application programs to initiate, execute and terminate a transaction using IBM's peer-to-peer LU6.2 protocols. IBM has designated APPC as the common communications protocol for its Systems Application Architecture, so it clearly will play a major part in the vendor's unfolding communications strategy.

APPC's strengths

One of APPC's fundamental strengths is that it does much of the work of error detection and correction, while HLLAPI leaves such work up to the application. Another advantage of APPC is that its verbs exist in micro, mini and mainframe environments, so the potential exists for application development across these heretofore-incompatible spheres.

One APPC drawback is that it requires extensive coding on the PC and the mainframe because each program is quite specific to its target application. The code that is created to implement APPC is much more sophisticated than the code required for HLLAPI applications. Third-party vendors are undecided about the approach to implementing APPC in local-area networks and current workstation configurations.

HLLAPPI and APPC have common goals but quite separate uses. The goal is to create a workstation that links end users to mainframes without the need for extensive end-user training. HLLAPI lets you front-end existing 370/3270 application software without modifying the mainframe code.

APPC will not interface to your current IBM 370 applications. APPC applications will be developed specifically for distributed processing without mainframe intervention. HLLAPI will be useful for extending the shelf life of existing code; APPC will allow the future development of very sophisticated workstation applications.

The next five years will be the age of the application program interfaces. Systems developers will have to learn graphic-interface APIs, OS/2 APIs and communications APIs to keep up. Sorting out these tools will be time-consuming and initially unpleasant, but the potential advantages of company-wide access to corporate systems are monumental.

Barrett is president of F. J. Barrett and Associates, a connectivity consultant and training firm in Irvine, Calif.

Transmission

FROM PAGE 59

equipment they need to support a data communications backbone and now face increasing traffic, he added. Thus they need compression devices to economize transmission lines and systems to manage and ensure reliability on growing networks.

The survey also found that during the next two years, AT&T and the local telephone companies will lose some of their share of corporate communications budgets to MCI Communications Corp., U.S. Sprint Communications Corp., value-added network vendors and private network equipment companies (see chart page 59).

This trend stems partly from a growing cost-consciousness that has firms shopping for bargains — often offered by AT&T's rivals, Newton said. Another factor is the increasing number of firms that plan to bypass local carriers with private lines, he said. At least 20% of the respondents said they are planning the local bypass capability.

Value-added network vendors will snag market share from firms that want to use packet-switching services to link remote sites with relatively low traffic back to a central site, Newton said. Helping this trend is the fact that integrating packet switching and IBM's Systems Network Architecture is "much more doable today," he added.

NEW PRODUCTS

Local-area networking hardware

Madge Networks, Inc. has begun shipping its **Local Ring Hub** to U.S. distributors, systems integrators and OEM customers.

The product is an access and expander unit that allows users to add personal computers to a token-ring network without recabling. The device does not require an external power source or battery and plugs into an existing token-ring wall outlet. According to the vendor, as many as three Local Ring Hubs can be daisy-chained together to add a total of 10 personal computers or terminals to a token-ring network socket.

The Local Ring Hub costs $445.

Madge Networks, Roanoke, Va. 703-982-0638.

A network controller card for 12-, 16- and 20-MHz IBM Personal Computer AT-compatible microcomputers is available from **The NTI Group**.

The **Desnet** local-area network reportedly includes an 8-MHz on-board processor and uses 32K bytes of semi-random-access memory. Other bus configurations include the S-100 bus (IEEE 696) and Intel Corp. Multibus (IEEE 796).

In addition to the controller board, the company has introduced **TAP III**, a network transceiver that incorporates troubleshooting circuitry and indicator lights to aid in network installation and repair. The transceiver reportedly provides a network length of more than 3,000 ft without repeaters.

The Desnet network controller card costs $410. TAP III costs $105 for a quantity of one.

The NTI Group, 3265 Kifer Road, Santa Clara, Calif. 95051. 408-739-2180.

Local-area networking software

Datanex, Inc. has announced communications software for the Digital Equipment Corp. VAX and PDP-11 machines and the IBM Application System/400 computers.

Hasp+ features automatic route-back capability, which allows files from the IBM end to be directed to print queues, batch queues or specific users. Job submissions, file transfer and automatic routing can be extended to VAX nodes in a Decnet or Vaxcluster environment. The AS/400 system requires IBM standard communications subsystem hardware and the IBM Remote Job Entry facility communications software for the DEC link. The DEC system requires Hasp+ communications software and a standard DEC communications board.

Prices for Hasp+ on the Microvax start at $3,500, and for VAX machines, prices start at $5,500.

Datanex, P.O. Box 1728, Eugene, Ore. 97440. 503-687-2500.

Network management

RND, a subsidiary of **RAD Data Communications, Inc.**, has recently introduced the **Remote Ethernet Management Station**, a dedicated control station designed to control and monitor a bridge or router network.

According to the vendor, the system will monitor serial links between bridges, observe a local-area network connected to a particular bridge and regulate actual bridge performance. The product is designed for use with RAD's Remote Ethernet Bridges.

Pricing for the Remote Ethernet Management Station starts at $5,950.

RAD Data Communications, 151 W. Passaic St., Rochelle Park, N.J. 07662. 201-587-8822.

Network services

AT&T has begun to take orders for **International Accunet Digital Services** on undersea fiber-optic cable among the U.S., Belgium, the Federal Republic of Germany, the Netherlands and Switzerland, according to the company.

International Accunet Digital Services reportedly offers high-capacity digital transmission via the Atlantic link of the Worldwide Intelligent Network — the TAT-8 cable. The Services will provide private-line data transmission at speeds of 56K bit/sec., 64K bit/sec., 1.544M bit/sec. and 2.048M bit/sec. The 2.048M bit/sec. service is available only between the New York gateway and Europe.

Rates for the services will range from $3,600 to $9,500 per month. For higher volume customers, AT&T offers a pricing plan with discounts of 5% to 15% on International Accunet Digital Services.

AT&T, 1200 Mt. Kemble Ave., Basking Ridge, N.J. 07920. 800-222-0400.

Links

Digital Communications Associates, Inc. (DCA) has announced a software product that will allow personal computer users to access graphics applications stored on a mainframe computer. The **3270 APA Graphics** product is scheduled to be available this fall and will be priced at $495.

DCA has also introduced the **Irmax DFT**. The software reportedly uses distribution function terminal technology to boost the communications processing power of personal computers that are linked to mainframe computers. The product will be available later this summer and will have an introductory price of $295 for just the software. The introductory price of a complete system, including both hardware and software, will be $995. Introductory pricing is effective through Jan. 31, 1989.

DCA, 1000 Alderman Drive, Alpharetta, Ga. 30201. 800-221-3678.

THERE'S NOTHING TOO REMOTE FOR OUR PRINTING SYSTEMS.

Whatever you need for remote printing, Northern Telecom has the answer. We can provide high-speed data communications at up to 56KB. Able to access computers using SNA, Async and HASP protocols. And we deliver multiple printer support, too. With every kind of printer. From matrix, to line, to state-of-the-art producers of up to 60 pages per minute.

Northern Telecom brings you the Total Print Solution. Including complete remote printing systems along with on-site training, installation, and our own service organization that covers 120 cities all across the country. To learn how almost 20 years of experience have made Northern Telecom a proven leader in remote printing, call us at 1-800-331-3113.

nt northern telecom

NETWORKING

© 1988 Northern Telecom

A Limited Offer to Corporate Decision Makers

DATAPOINT POINT:

INTRODUCING DATALAN.

Speed and compatibility you won't believe in a PC network. Until you try it.

DATALAN™ from Datapoint has the speed and performance you need to create a supercharged PC network. In benchmark tests covering critical areas of operation, DATALAN was faster than Novell® and PC-Net® and outperformed them in the great majority of tests, often by a wide margin.† With DATALAN you don't have to give up standards to gain performance because it's fully compatible (NetBIOS) with MS-DOS.™

Try DATALAN in your office for 30 days risk-free! Call 1-800-334-9968 to order today.

Take advantage of the DATALAN network introductory special for $995. You'll receive a complete three-user network including:

- *Three ARCNET™ network adapter cards*
- *Three ARCNET NETBIOS modules*
- *Four-port passive hub*
- *DATALAN/4 software*

Just add your PCs and cables to test DATALAN for yourself. Try it for 30 days. If you're not completely satisfied, return the package for a full refund. Use VISA, MasterCard, or corporate purchase order. To place your order for immediate shipment, call 1-800-334-9968. Or write

Datapoint Corporation
9725 Datapoint Drive
San Antonio, Texas 78284

† Call Datapoint for benchmark test results.

This offer is limited to customers in the United States and is valid only through December 31, 1988.

Datapoint and the "D" logo are trademarks of Datapoint Corporation, registered in the U.S. Patent and Trademark Office. DATALAN and ARCNET are trademarks of Datapoint Corporation.
MS-DOS is a trademark of Microsoft Corporation.
Novell is a registered trademark of Novell, Inc. PC-Net is a registered trademark of International Business Machines Corporation.
© 1988 Datapoint Corporation

DATAPOINT

PCs, WORKSTATIONS AND SMALL SYSTEMS

Classic buses finish ahead in PC market

BY ALAN J. RYAN

Listening to IBM 18 months ago, you might have gotten the impression that personal computers in corporate America would soon be going the way of the abacus, slide rule and adding machine. IBM was convinced that everyone would rush to follow the leader in the direction of its Personal System/2s, the Micro Channel Architecture (MCA) and OS/2 Extended Edition.

While some argue that the migration toward MCA is beginning, the market research numbers show that it is happening only at a glacial pace.

"At this point, the Micro Channel has been tolerated," says Michael Goulde, director of corporate information solutions at CAP International, Inc. in Norwell, Mass. "People who would have bought IBM are buying IBM, but it is not clear that people have moved away from other brands to buy IBM."

"Classic" AT-style bus-based PCs with Intel Corp.'s 80286 and 80386 microprocessors made by IBM competitors have continued to sell at a rapid-fire pace this year, causing IBM to lose ground.

What is more, IBM's own non-MCA PS/2s are among the most popular offerings in the industry giant's product lineup. And last month, IBM created quite a stir when it introduced a non-MCA machine based on the 80286 microprocessor, which analysts speculated was a move to counteract sagging sales.

In 1988, 80386-based personal computers will account for 16.7% of all PCs shipped in the U.S., projects Bruce Stephen, senior PC analyst at International Data Corp. in Framingham, Mass. IBM's share of the 386 pie will be a little more than one-quarter; other vendors will gobble up the remaining 900,000 units shipped.

MICK WIGGINS

PERSONAL COMPUTERS

That's not all the bad news for Big Blue. According to Stephen, 52% of PCs sold in the U.S. this year will be based on the 80286 microprocessor. IBM will account for one-fourth of those units, claiming a 3% smaller share than last year.

Of the total U.S. shipments of IBM and compatibles, IBM will roll in at approximately 23.6% this year, Stephen says. While that figure is quite respectable, it is still down from last year's share of 26.2%.

Next year may tell a different story.

Clare Fleig, director of research at International Technology Group in Los Altos, Calif., says that while the PC architecture has been strong in 1988, "I do think you will see a stronger shift to the PS/2 in 1989."

La Jolla, Calif.-based Computer Intelligence is getting the same readings. The PS/2 family will account for more than two-thirds of all PCs purchased by the Fortune 1,000 during the next year, that firm predicts, with Compaq Computer Corp. following at a distant second and Apple Computer, Inc. coming in third with 5%.

Of the PS/2 models, the Computer Intelligence report found that the MCA-based Models 50 and 60 would account for the majority of the purchases during the next year.

But reaching those levels will take some stretching after this year's lackluster reception.

Early emulators

Even though users didn't rush out to buy the MCA this year, vendors spent a great deal of time trying to copy it. Late last year and earlier this year, chip makers and BIOS vendors announced that they would make MCA-compatible products for cloners.

In October 1987, Western Digital Corp. announced tools that would allow OEMs to put IBM PS/2 compatibles on dealer shelves by the summer of 1988. On the heels of that announcement, Phoenix Technologies Ltd. unveiled its line of read-only memory BIOS products in November that would provide compatibility with the BIOS used by IBM in the PS/2s. And in January, Chips and Technologies, Inc. announced chip sets compatible with the PS/2 Models 50, 60 and 80.

While all this was happening, Intel was busy working on its own MCA-compatible chip set.

After the chip sets and BIOS announcements came a flood of talk about compatibles. Vendors indicated that, given their success in copying the IBM PC, they would follow IBM and legally clone the proprietary MCA. So far, however, all the talk has not produced much follow-through. Most of the plans were put on hold after it became clear that

Ryan is a *Computerworld* senior writer.

INSIDE

High-Speed Chase
Minisuper workstations are the new game in town, and everyone wants to play. Page 77.

The Go-Go Years are Gone
The small systems market is settling into a staid and standardized middle age. Page 85.

Finish

FROM PRECEDING PAGE

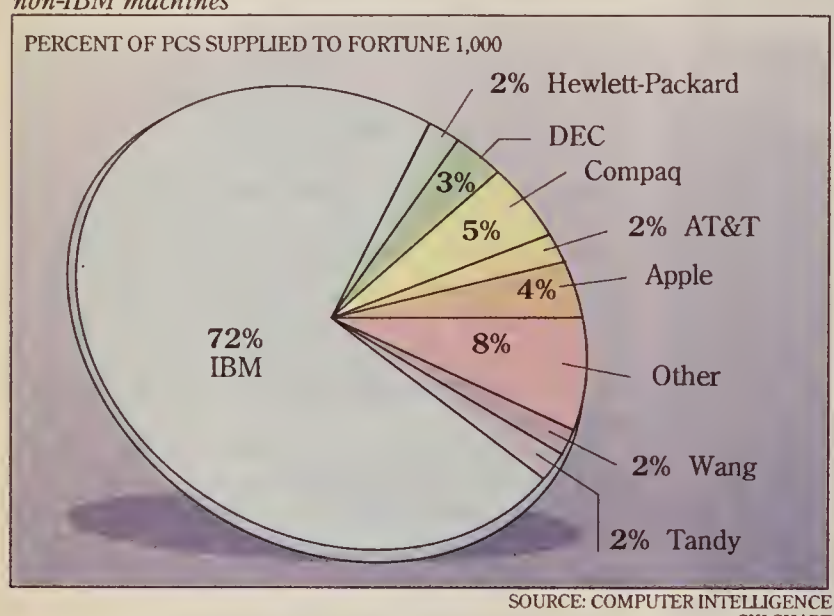
users were not lining up.

Tandy Corp. has been the only major player shipping a PS/2 clone using the Intel chip set. Its Tandy 5000MC is ready, but according to director of market planning Ed Juge, the demand is quite small.

Not even the mid-year announcement of more practical and speedier models in the PS/2 family caused much of a stir. While the fresh units made interesting improvements in the line, sales of the Model 70 have been slow, and sales of the Models 50 and 60 are expected to decline because of IBM's non-MCA 80286-based Model 30, announced in September, according to IDC's Stephen.

Cornering the market

Only one-fourth of all PCs supplied to Fortune 1,000 sites are non-IBM machines



SOURCE: COMPUTER INTELLIGENCE
CW CHART

With most of the clone plans on hold for now, questions are again surfacing about the viability of MCA. For some users, the decision of whether to buy into IBM's strategy was easy from the start. Many said they would prefer to wait until MCA became a standard and would continue to buy the classic-style bus machines until then.

One significant announcement in that area came from Compaq, with its June introduction of the Deskpro 386 25-MHz machine, which "carries Compaq well into the upper reaches of the low end in terms of performance and price," CAP International's Goulde claims.

Adding fuel to the fire, in September many of the PC-compatibles vendors banded together to announce the Extended Industry Standard Architecture (EISA). The group said any clone maker will be allowed to license the 32-bit extended AT-style EISA bus, giving users yet another alternative to MCA.

IBM itself has shown users that the AT-style bus is right for many users. In mid-July, it teamed up with Microsoft Corp. to introduce DOS 4.0, which provides users with some of the benefits of OS/2, such as a menu-driven interface. When coupled with a windows-style application manager, DOS 4.0 will allow its users to perform some multitasking operations.

The upgraded operating system also incorporates the Lotus/Intel/Microsoft Expanded Memory Specification 4.0, and it complies with IBM's Systems Application Architecture (SAA). It also has extended video and graphics capabilities.

Why choose?

One small company, Wells American Corp. in West Columbia, S.C., has found a way to capitalize on the current ambivalence in the market. In July, it unveiled Compustar, which can be configured as either a Personal Computer AT or an MCA compatible, or both, for users who don't know which way to turn.

Indications are that IBM has tuned in to the same theme with the Model 30 286. The unit fits between the Models 30 and 50 but does not incorporate MCA.

Still, IBM is holding fast, maintaining that the Model 30 should not be interpreted as the company's turning its back on its proprietary bus architecture. "If we could have put a Micro Channel Architecture on the Model 30 286 at the same price, we certainly would have," said Bill Lyons, IBM vice-president of software marketing, at a press briefing in September.

Easy hike

Another factor that may weigh against fast PS/2 purchase decisions and broaden the field of choice for users is Intel's 80386SX chip, announced in June. The SX chip, as it is called, allows software designed for 32-bit 80386-based machines to run on the slower 16-bit data path at a 32-bit processing speed.

Companies building computers around this chip, such as NEC Corp. and Compaq, say they believe that power-hungry users who cannot afford full-fledged 80386 computers will opt instead for the 386SX.

Compaq announced the Deskpro 386S in June, with prices ranging from $3,799 to $5,199. NEC announced its Powermate SX and Powermate Portable SX, priced at $4,495 and $6,595, respectively, in August.

The possible effects of 80386SX-based systems include "setting new entry price levels into 386 architecture, putting pressure on pricing for 286 systems and limiting the market for 8086-based systems," CAP International's Goulde says.

The SX chip could bring about pricing competition on the 386 front, says John McCarthy, director of professional systems services at Forrester Research, Inc. in Cambridge, Mass. Because Intel is not cross-licensing the 386 microprocessor, prices on that product will not drop as quickly as they did on the 80286, 8088 and 8086, he says. The SX chip gives users a more cost-effective alternative and could hurt 80386 sales. That, in turn, could help to cut the 386 prices.

Drought spares new crops

In previous years, the price tag on PC technology has dropped rapidly, and new products have often been introduced at the same price points as products they were replacing. But this year's shortage of dynamic random-access memory (DRAM) chips has created a negative trend here.

In March, PC prices began to climb because of the chip drought. Some vendors, like Zenith Data Systems Corp., reduced the amount of memory in their machines to keep prices stable.

In May, the DRAM shortage indefinitely delayed the upgrade model of Apple's Macintosh SE, although the company introduced a 4M-byte configuration of the Macintosh II in August at Macworld Expo/Boston.

Forrester's McCarthy and other analysts say they believe the shortage will begin to ebb later this year. In the meantime, the DRAM drought, while affecting the amount of memory some vendors ship with their machines, has not slowed action noticeably on the development side. Some notable developments in the past year have come in the laptop and portable area, analysts say.

The new line of Zenith portables, announced in April, included the 8088-based Supersport, the Supersport 286 and Turbosport 386. These, Goulde says, "apparently were strong enough offerings that they froze a couple of other vendors in their paths," including IBM and Compaq.

Even if a laptop announcement by Zenith shook Compaq, the company overall has been doing things right this year, by most accounts. According to IDC's Stephen, Compaq will ship approximately 575,000 units this year, mostly to the corporate marketplace. The company continues to make major inroads into IBM territory. And with the Sept. 13 EISA announcement, Compaq could push further into the Fortune 1,000.

The year has also been a busy one for Apple, which is a significant player but one that still remains rather weak in DOS-dominated corporate America. Some say Apple's March lawsuit against Microsoft and Hewlett-Packard Co. indicate Apple's fear of losing whatever ground it has gained there. The lawsuit accused Microsoft and HP of violating Apple's copyrighted user interface, which the companies brought to DOS and OS/2 users.

While Apple's worldwide PC market share is expected to be nearly 10% this year, according to IDC, many of those units will not wind up on corporate desktops. "They are still shipping a lot of low-end units," IDC's Stephen says. Of Apple's expected 1.5 million units shipped this year, about 775,000 will be the higher end Macintoshes, he says.

To try to bolster its presence in the corporate market, Apple has been increasing its connectivity and communications capabilities by acquiring two connectivity companies, Network Innovations Corp. and Orion Network Systems, Inc.

In addition, a strategic alliance with Digital Equipment Corp., announced early in the year, would allow the Macintosh to communicate with DEC computers, giving DEC the desktop workstation it needs and giving the Macintosh an easy inroad into DEC shops.

Both the Apple-DEC alliance and the cloners' AT-bus consortium are likely to produce some action and dramatic tension in the coming year. Despite IBM's best efforts, none of these players is likely to go the way of the adding machine anytime soon. •

The year in PCs

- **October 1987:** IBM promotes the Personal System/2 Model 60 with a price cut. Western Digital Corp. announces tools that would allow OEMs to put PS/2 compatibles on dealer shelves by the summer of 1988.
- **November:** Phoenix Technologies Ltd. unveils its line of read-only memory BIOS products that would provide compatibility with the BIOS used by IBM in the PS/2s. The Phoenix BIOS supports the Micro Channel Architecture (MCA).
- **December:** IBM begins delivery of OS/2.
- **January 1988:** Chips and Technologies, Inc. announces chip sets compatible with the PS/2 Models 50, 60 and 80.
- **February:** Kaypro becomes the first micro vendor to reveal definite plans to clone the PS/2 MCA, saying it would ship the system by the end of May.
- **March:** Shortage of memory chips for personal computers starts to become a problem; PC prices start to climb. Apple Computer, Inc. files lawsuit against Microsoft Corp. and Hewlett-Packard Co., saying the companies violated Apple's copyrighted user interface. Tandy Corp. acquires Grid Systems Corp., a laptop computer maker.
- **April:** Microsoft countersues Apple, charging slander and attempts to stifle development. IBM hikes PC royalty rates for companies that license current and future IBM patents. Tandy and Dell Computer Corp. announce clones of the MCA. Kaypro pushes back release of its MCA clone until the third quarter, saying it is unsure which chip set it will use.
- **May:** Dynamic random-access memory shortage indefinitely delays upgraded model of the Apple Macintosh SE. IBM announces discontinuation of the 3270 PC.
- **June:** More models — the 50Z and the 70 386 — are added to the IBM PS/2 family. IBM unveils plan to let users trade in their PCs for PS/2s, but trade-in prices are too low for most users. Intel announces its 80386SX chip, a 32-bit microprocessor that uses a 16-bit external data bus. Compaq introduces its fastest 80386-based PC with the Deskpro 386/25. Also announced is the Compaq Deskpro 386S, based on the 386SX chip.
- **July:** IBM and Microsoft announce DOS 4.0.
- **August:** Tandy bolsters PC line with new versions of 8088-, 80286- and 80386-based microcomputers.
- **September:** IBM introduces PS/2 Model 30 286, an 80286-based machine using a bus similar to the PC AT bus. EISA group formed.

ALAN J. RYAN

Here's One '286 Computer That Won't Be Shocked By The Next Generation.

Two kinds of people buy the award-winning AST Premium® /286: those who live for today and those concerned about the future.

People who live for today buy the AST Premium/286 because it's the hottest 286 on

	AST Premium/286 Model 140X	IBM® PS/2™ Model 50Z 031	Compaq® DeskPro 286™ Model 40
CPU speed (MHz)	10, 8, 6	10	12, 8
Wait States	0	0	1
Max. 0 Wait-State Memory	16 MB	2 MB	0 MB
Expanded Memory	EEMS/EMS 4.0 Included	Extra Cost	Extra Cost
Hard Disk Size/Speed	40 MB/28ms	30 MB/39ms	40 MB/28ms
DOS 3.3 and GW-BASIC®	Included	Extra Cost	Extra Cost
Easy 386 CPU Upgradeability	Yes	No	No

the market. In fact, among its many distinctions is the "Best of '87" award given by PC Magazine. But for those who can't stop thinking about the demands of the next generation of application software, the AST Premium/286 represents something different. Security.

Only the AST Premium/286 offers up to 16 MB of zero wait-state RAM, using AST Advanced FASTRAM™ memory. Which is the kind of wide-open power you need to run memory-intensive Lotus® 1-2-3® and dBASE® applications today.

★★★★ **Top Rated '286 PC** —PC Digest™ May 1988

Plus, you're all set to take advantage of applications written for MS® OS/2™ from AST in the future. In fact, in NSTL's latest independent OS/2 system benchmarks, AST Premium/286 finished first.*

And when you're ready for 386™ CPU power, AST's proprietary FASTslot™ architecture provides easy upgradeability. Simply plug in the AST Premium FASTboard/386™ for true 32-bit, 16 MHz power with high-speed 64Kb cache memory.

To find out more, visit your nearest AST authorized system dealer today, or call **(714) 863-0181** and ask for **operator AA77.**

☐Please send information on the AST Premium/286.
☐Yes, have an AST respresentative call me.

Name _____
Title _____
Company _____
Address _____
City _____ State _____ Zip _____
Phone (_____) _____
I am an ☐End user ☐Reseller.
Send to: AST Research, Inc. 2121 Alton Avenue
Irvine, California 92714-4992, Attn: M.C.

COMPUTERWORLD 10/3/88

AST® RESEARCH INC.

AST is proud to sponsor NBC's telecast of the 1988 Summer Olympics

Times Have Changed.

*PC Digest. May 1988. Independent Comparative Ratings Report for selecting PC Systems and Peripherals. **AST markets products worldwide—in Europe and the Middle East call 44 1 568 4350; in Japan call 813 447 8303; in the Far East call 852 5 717223; in Canada call 416 826-7514.** AST, AST logo and AST Premium registered and FASTslot, FASTRAM, and AST Premium FASTboard/386 trademarks AST Research, Inc. 386 trademark Intel Corp. All other product and brand names are trademarks and registered trademarks of their respective companies. Copyright © 1988 AST Research, Inc. All rights reserved.

The powers that be on the new power in VAX® software.

VAX is a registered trademark of the Digital Equipment Corporation. IDMS/SQL and KnowledgeBUILD are trademarks of Cullinet Software, Inc.

IDMS/SQL® and KnowledgeBUILD®

The power to make or break products in the computer industry begins with a few powerful people. Consultants. And analysts. When they talk, we listen.

On IDMS/SQL: "Cullinet has delivered as promised—a relational database management system for the DEC VAX with superior performance, reliability and security."
—Charlotte Walker

On KnowledgeBUILD: "What vendors offer in the way of development tools, is in my mind, an increasingly important distinction. Cullinet is in the front of the pack on performance, but it's the power and sophistication of their KnowledgeBUILD toolset that gives them the edge for tomorrow."
—Michael Braude

On VAX and mainframe connectivity: "A clear demonstration that Cullinet now offers not only a powerful database and a rich development environment for the VAX, but also an architecture that permits a simple transparent exchange of data between a mainframe and VAX."
—Charlotte Walker

On the future: "Cullinet has given us a good example of strategic product development. I expect they will shortly evolve this architecture to the point where it is CPU independent. And they will be able to port it from the VAX to any other platform with full power and functionality intact."
—Michael Braude

In the race for greater performance and productivity, you can't afford to settle for less for your VAX than the most powerful database and tools available: IDMS/SQL and KnowledgeBUILD.

Faster than the competition. Able to build on each other without compromising efficiency or flexibility. Giving you a product you can build on. And on. And on.

Just ask the most powerful people in the business.

Or write Cullinet Software, Inc., Marketing Services, 400 Blue Hill Drive, Westwood, MA 02090-2198.

Call Cullinet today about an IDMS/SQL Seminar near you. 1-800-551-4555.

Cullinet®
The power to build on.

Charlotte Walker, V.P., County NatWest Securities, U.S.A.

H. Michael Braude, V.P. and Director, Software Management Strategies, Gartner Group, Inc.

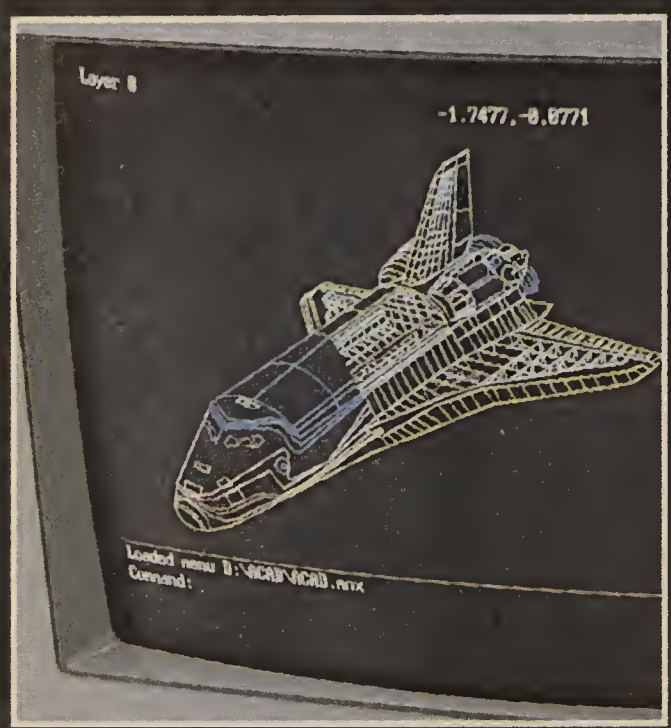
Personal computers

COMPANY	PRODUCT NAME	CPU (MICROPROCESSOR)	CLOCK SPEED (IN MHZ)	OPERATING SYSTEM	INTERNAL MEMORY RANGE (MEGABYTES)	DISK STORAGE RANGE (MEGABYTES)	NUMBER OF EXPANSION SLOTS	NUMBER OF SERIAL PORTS	NUMBER OF PARALLEL PORTS	DESKTOP OR PORTABLE	FOOTPRINT (IN INCHES)	SUPPORTS OS/2	SYSTEM PRICE
Acer Technologies (408) 922-0333	Acer 710	8088	10	MS-DOS	768K	20	Four	One	One	Desktop	14.2x16.2x5	Yes	$1,035-$1,565
	Acer 900	80286	12	MS-DOS	512K-16	40-70	Eight	Two	One	Desktop	21x16.4x6.5	Yes	$2,895-$3,495
	Acer 910	80286	10	MS-DOS	512K-16	20-40	Six	Two	One	Desktop	16.5x15.76x5.9	Yes	$2,195-$2,445
	Acer 915	80286	12	MS-DOS	512K-16	20-40	Four	One	One	Desktop	14.2x16.2x5	Yes	$2,295-$2,545
	Acer 1100	80386	16	MS-DOS	1-16	40-120	Eight	Two	One	Desktop	21x16.4x6.5	Yes	$4,295-$6,495
	Acer 1100/20	80386	20	MS-DOS	2-16	70-340	Eight	Two	One	Desktop	21x16.4x6.5	Yes	$6,695-9,995
	System 32/20	80386	20	SCO Xenix/386 Multiuser	2-16	100-760	Eight	Two	One	Desktop	6.3x16.5x20.9	Yes	$7,000-$12,000
Alcatel Information Systems (800) 528-1400	XTRA/Professional Series 300	8088	4.77, 10	MS-DOS	768K-768K	720K-20	Four	Two	One	Desktop	14.10x15.70x5.10	No	$1,299-$1,999
	XTRA/Professional Series 400	80286	6, 10	MS-DOS	1-16	1.44-72	Eight	One	One	Desktop	21.30x16.90x6.30	Yes	$2,699-$5,199
	XTRA/Professional Series S700	80386	16	MS-DOS, Xenix	1-16	20-40	Five	Two	One	Desktop	14.50x16.30x5.04	Yes	$2,999-$4,549
	XTRA/Professional Series 700	80386	8, 16	MS-DOS, Xenix	1-16	1.44-160	Nine	One	One	Desktop	21.3x16.9x6.3	Yes	$5,499-$11,299
Amdek (408) 436-8570	Amdek System 286	80286	8	MS-DOS	512K-16	1.2-20	Seven	One	One	Desktop	15x16.6x6.2	Yes	$1,595-$2,395
	Amdek System 286A	80286	12.5	MS-DOS	1-16	1.2-40	Seven	Two	One	Desktop	15x16.6x6.2	Yes	$2,495-$3,595
	Amdek System 386	80386	8, 16	MS-DOS	1-6	1.2-40	Six	Two	One	Desktop	15x16.6x6.2	Yes	$3,850-$4,950
	Amdek System 386E	80386	8, 16	MS-DOS	1-6	1.2-40	Nine	Two	One	Desktop	15x16.6x6.2	Yes	$4,250-5,350
AT&T (800) 247-1212	AT&T 6300 WGS	8086	10	MS-DOS	640K	20	Six	One	One	Desktop	15x16x6	No	$1,411-$2,091
	AT&T 6312 WGS	80286	12	MS-DOS, OS/2, Xenix	1024K	20-67	Six	One	One	Desktop	15x16.5x7.5	Yes	$2,595-$4,795
	AT&T 6286 WSG	80286	12	MS-DOS, OS/2, Xenix	1024K	20-40	Four	One	One	Desktop	14x15.5x5.75	NP	$1,995-$3,195
	AT&T 386 Work Group System	80386	20	MS-DOS, Unix	1-48	135	Seven	One	One	Desktop	NP	Yes	NP
	Premium/286 series	80286	10	DOS, Xenix, Novell, OS/2	512K-13	20-70	Seven	One	One	Desktop	19.25x16.5x6.25	Yes	$2,195-$4,595
	Premium Workstation/286	80286	10	MS-DOS	512K-4	40-40	Two	Two	One	Desktop	16.04x14.8x3.4	Yes	$1,695-$3,795
	Premium/386	80386	20	MS-DOS, OS/2, Unix	1-16	0-320	Seven	Two	One	Desktop	19.25x16.5x6.25	Yes	$5,195-10,795
Canon U.S.A., Inc. (516) 488-6700	Canon A-200 III Personal Computer	8086-2	4.77, 8	MS-DOS	640K	360K	Two	One	One	Desktop	15.75x15x4.75	No	$1,695
	Canon A-200EXII Personal Computer	80286	12	MS-DOS	1-16	40	Four	One	One	Desktop	14.1x16.1x4.75	Yes	$3,330-$4,430
	Canon A-200SX Personal Computer	80386	16	MS-DOS	1-16	40	Eight	Two	One	Desktop	12x17x6.5	Yes	$5,500-$6,480
Commodore Business Machines, Inc. (215) 431-9100	Amiga 500	68000	7.14	Amiga-DOS, MS-DOS	512K-9	.88-unlimited	One	One	One	Desktop	17.75x3.5x13	Yes	$799
	Amiga 2000	68000	7.14	Amiga-DOS, MS-DOS, Unix, C-64	1-9	.88-unlimited	11	One	One	Desktop	17x6.5x15.75	Yes	$2,195
	Amiga 2000 HD	68000	7.14	Amiga-DOS, MS-DOS, Unix, C-64	1-9	41-unlimited	11	One	One	Desktop	17x6.5x15.75	Yes	$2,999
	Amiga 2500	68000	14.3	Amiga-DOS, MS-DOS, Unix, C-64	3-9	41-unlimited	11	One	One	Desktop	17x6.5x15.75	Yes	$4,699
Compaq Computer Corp. (713) 370-0670	Deskpro Model 2	8086	7.14	MS-DOS	256K-640K	20	Seven	One	One	Desktop	19.8x16.5x6.4	No	$1,699
	Deskpro 286 Model 1	80286	12	MS-DOS/Basic Version 3	640K-8.1	1.2-1.44	Seven	One	One	Desktop	19.8x16.5x6.4	Yes	$2,699
	Deskpro 286 Model 20	80286	12	MS-DOS	640K-8.1	1.2-1.44	Seven	One	One	Desktop	19.8x16.5x6.4	Yes	$3,599
	Deskpro 286 Model 40	80286	12	MS-DOS	640K-8.1	1.2-1.44	Seven	One	One	Desktop	19.8x16.5x6.4	Yes	$4,199
	Deskpro 386 Model 40	80386	16	MS-DOS	1-14	1.2-1.44	Six	One	One	Desktop	19.8x16.5x6.4	Yes	$7,999
	Deskpro 386/20 Model 60	80386	20	MS-DOS, OS/2	1-16	1.2-1.44	Six	One	One	Desktop	19.8x16.5x6.4	Yes	$7,499
	Deskpro 386/20 Model 130	80386	20	MS-DOS Version 3, OS/2	1-16	1.2-1.44	Five	One	One	Desktop	19.8x16.5x6.4	Yes	$9,499
	Deskpro 386 Model 1	80386SX	16	MS-DOS Version 3, OS/2	1-13	1.2-1.44	Four	One	One	Desktop	15.8x14.8x5.9	Yes	$3,799
	Deskpro 386 Model 20	80386SX	16	MS-DOS Version 3, OS/2	1-13	1.2-1.44	Four	One	One	Desktop	15.8x14.8x5.9	Yes	$4,499
	Deskpro 386 Model 40	80386SX	16	MS-DOS Version 3, OS/2	1-13	1.2-1.44	Four	One	One	Desktop	15.8x14.8x5.9	Yes	$5,199
	Deskpro 386/25 Model 110	80386	25	MS-DOS Version 3, OS/2	1-16	1.2-1.44	Six	One	One	Desktop	19.8x16.5x6.4	Yes	$10,299
	Deskpro 386/25 Model 300	80386	25	MS-DOS Version 3, OS/2	1-16	1.2-1.44	Six	One	One	Desktop	19.8x16.5x6.4	Yes	$13,299
	Portable II Model 2	80286	8	MS-DOS Version 3, OS/2	256K-4.1	360K-1.44	Two	One	One	Portable	17.7x13.9x7.5	Yes	$2,699
	Portable II Model 4	80286	8	MS-DOS Version 3, OS/2	640K-4.1	360K-1.44	Two	One	One	Portable	17.7x13.9x7.5	Yes	$3,999
	Portable III Model 20	80286	12	MS-DOS Version 3, OS/2	640K-6.6	1.2-1.44	Two	Two	One	Portable	16x7.8x9.8	Yes	$4,999
	Portable III Model 40	80286	12	MS-DOS Version 3	640K-6.6	1.2-1.44	Two	One	One	Portable	16x7.8x9.8	Yes	$5,799
	Portable 386 Model 40	80386	20	MS-DOS Version 3, OS/2	1-10	1.2-1.44	Two	Two	Two	Portable	16x7.8x9.8	Yes	$7,999
	Portable 386 Model 100	80386	20	MS-DOS Version 3, OS/2	1-10	1.2-1.44	Two	One	One	Portable	16x7.8x9.8	Yes	$9,999

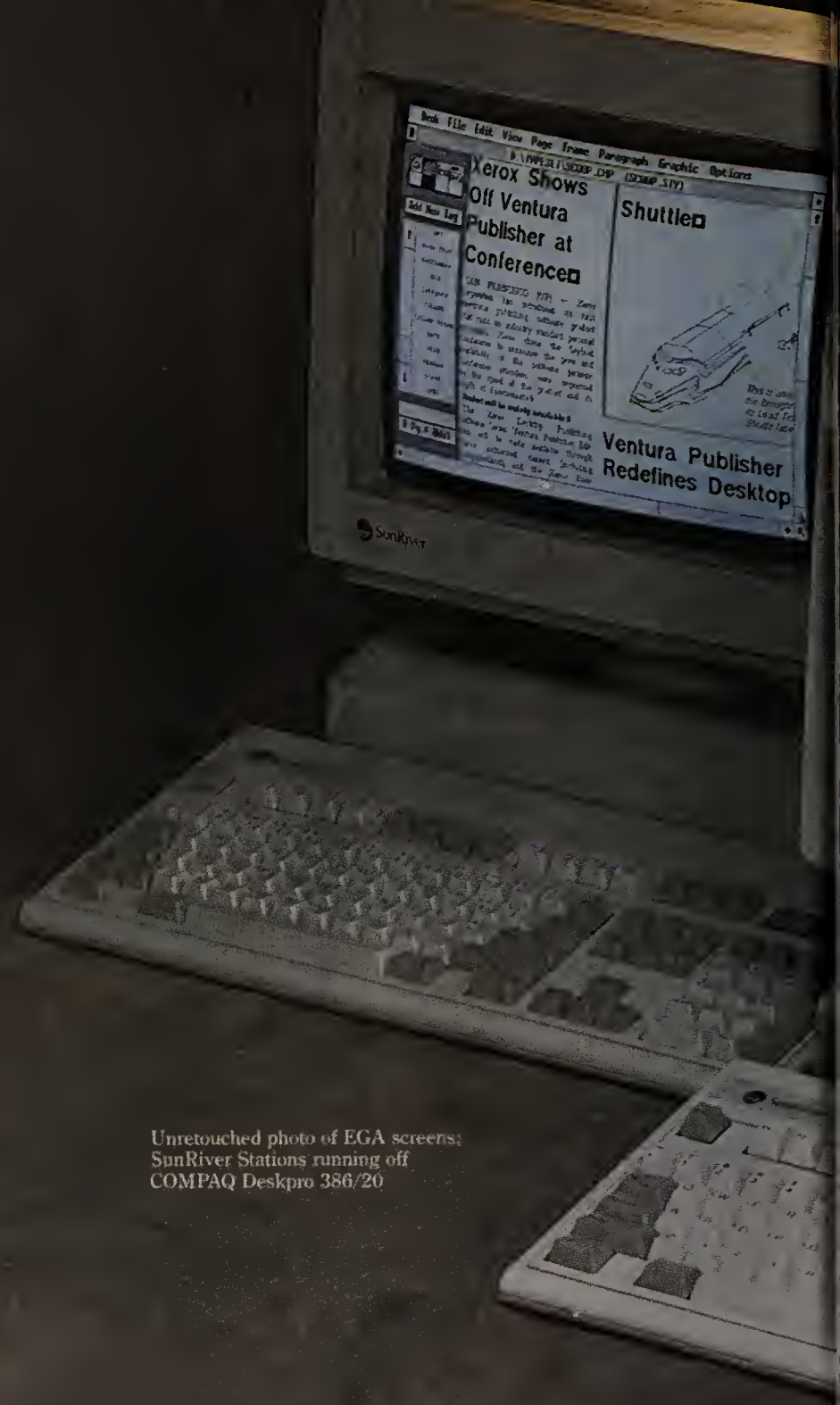
The companies included in this chart responded to a recent telephone survey conducted by *Computerworld*. When a vendor is unable to provide specific information about its product, the abbreviation NP (not provided) is used. When a question does not apply to a vendor's product, the abbreviation NA (not applicable) is used. Further product information is available from the vendors.

COMPANY	PRODUCT NAME	CPU (MICROPROCESSOR)	CLOCK SPEED (IN MHZ)	OPERATING SYSTEM	INTERNAL MEMORY RANGE (MEGABYTES)	DISK STORAGE RANGE (MEGABYTES)	NUMBER OF EXPANSION SLOTS	NUMBER OF SERIAL PORTS	NUMBER OF PARALLEL PORTS	DESKTOP OR PORTABLE	FOOTPRINT (IN INCHES)	SUPPORTS OS/2	SYSTEM PRICE
Contel Business Systems (800) 426-6835	Contel Solution/1 Model 100	80386 main processor, 80186 applications processor	16	Cadol, Unix	2-16	40-400	1 multibus	Two standard, 11 maximum	One	Both	14.5x18x5.5	No	NP
Convergent Technologies, Inc. (408) 434-2848	CWS	80186	8	CTOS	1-1	None	None	One	None	Desktop	12.2x11.2x3.3	No	$1,500
	NGEN Series 186	80186	8	CTOS	512K-1	320	None	Two	One	Desktop	12x5.75x8	No	$2,100-$16,000
	Series 286 Processor CP-OA2	80286	8	CTOS, MS-DOS	1-4	80-2,200	None	Two	Two	Desktop	12x5.75x8	No	$2,800-$30,000+
	Series 386 Processor CP-OA3	80386	16	CTOS, MS-DOS	1-4	80-2,200	None	Two	One	Desktop	12x5.75x8	No	$4,800-$30,000+
	Network PC 386	80386	16	MS-DOS, Xenix	1-1	40-40	Three	One	One	Desktop	15x15x3.5	Yes	$3,267-$4,925
	Network PC	80286	8	MS-DOS, Xenix	1-1	40-40	Three	One	One	Desktop	15x15x3.5	Yes	$1,575-$3,100
Cordata, Inc. (213) 603-2901	CS45	8088-1	4.77, 8.0, 10	MS-DOS	640K	360K-20	Four	One	One	Desktop	13.5x16x5.4	No	$895-$1,295
	CS 4600	80286	12	MS-DOS	51K-4	1.2	Eight	Two	One	Desktop	19.5x6.0x16.5	Yes	$1,995
	CS 5000	80386	16, 20	MS-DOS	1-16	40-80	Six	Two	One	Desktop	19.5x16.75x6	Yes	$3,070-$6,395
	WPC Bridge (color model)	8088-1	4.77, 8, 10	MS-DOS	640	360-720K	Three	Two	One	Desktop	13.5x16x5.4	No	$1,798
	WPC Bridge (color model)	65C02	10	MS-DOS	640	360-720K	Three	Two	One	Desktop	13.5x16x5.4	No	$1,798
	WPC Bridge	8088-2	4.77, 8	MS-OS	512-768K	Up to 20	Three	One	One	Desktop	13.5x16x16	No	$1,695-$2,095
	WPC Bridge	65C02	10	MS-DOS	512-768K	Up to 20	Three	One	One	Desktop	13.5x16x16	No	$1,695-$2,095
Core International Inc. (407) 997-6055	Atomizer 286	80286	12	DOS, Xenix, Unix, OS/2	512K-4	40-760	Eight	One	One	Desktop	21x16x6.5	Yes	$1,350-$11,742
	Atomizer 386/20	80386	20	DOS, Xenix, Unix, OS/2	1-16	40-760	Eight	One	One	Desktop	21x16x6.5	Yes	$2,995-$13,387
Data General Corp. (508) 366-8911	Data General/One Model 2T	80C88-2	7.16, 4.77	MS-DOS	512K-2	720K-20	Four	Two	One	Portable	14x11.25x3	No	$1,695-$4,345
	Dasher/286	80286	10	MS-DOS	640K-2.5	20-80	Six	Two	One	Desktop	17.5x16.2x6.25	No	$3,995-$9,355
	DG/500	Micro Eclipse	2.63	DG/RDOS	.5-2	20-160	Five	18	One	Desktop	19.25x16.25x6.25	No	$4,995-16,100
Dell Computer (512) 338-8348	Dell System 100	8088	9.54	MS-DOS	640K-8.6	20-20	Three	One	One	Desktop	3.25x14.75x15.75	No	$1,099-$1,999
	Dell System 200	80286	12.5	MS-DOS, OS/2	640K-16	20-322	Six	Two	One	Desktop	6.4x21.1x17.6	Yes	$2,099-$6,299
	Dell Systemn 220	80286	20	MS-DOS, OS/2	1-16	40-100	Three	Two	One	Desktop	4x15x15.6	Yes	$2,299-$4,099
	Dell System 310	80386	20	MS-DOS, OS/2	1-16	40-322	Eight	Two	One	Desktop	21.1x17.6x6.4	Yes	$4,099-$7,699
	Dell System 325	80386	25	MS-DOS, OS/2	2-16	150-610	Eight	Two	One	Desktop	21.1x17.6x6.4	Yes	$7,199-$11,499
Digital Equipment Corp. (800) 344-4825	Vaxmate Personal Computer	80286	8	MS-DOS	1-3	20-40	Six	Two	None	Desktop	11.25x16x15	No	$3,495
Epson America, Inc. (800) 922-8911	Equity I+	8088	4.77, 10	MS-DOS	640K-15.5	20	Five	One	One	Desktop	14.4x14.8x5.7	No	$1,099-$1,699
	Equity II+	80286	8, 12	MS-DOS	640K-15.5	40-70	Six	One	One	Desktop	15.7x16.3x6.1	No	$1,599-$2,699
	Equity III+	80286	6, 8, 12	MS-DOS	640K-15.5	40	Nine	One	One	Desktop	19.6x17.4x6.6	No	$2,199-$3,299
	Equity LT	V-30	4.77, 10	MS-DOS	640K-640K	20-20	Two	One	One	Portable	13.6x12.2x3.1	No	$1,899-$2,999
Everex Systems, Inc. (415) 490-1111	Step 286	80286	8, 10, 12, 16, 20	MS-DOS	512K-16	1.2	Eight	Two	Two	Desktop	21.1x16.6x6.2 small, 17.2x16.6x6.2 large	Yes	$2,399-$4,599
	Step 386	80386	16, 20, 25	MS-DOS	512K-16	1.2	Eight	Two	Two	Desktop	17.2x16.6x6.2	Yes	$2,399-$4,599
	OEM Version 286	80286	8, 10, 12, 16, 20	MS-DOS	512K-16	1.2	Eight	Two	Two	Desktop	21.1x16.6x6.2 small, 17.2x16.6x6.2 large	Yes	$2,399-$4,599
	OEM Version 386	80386	16, 20, 25	MS-DOS	512K-16	1.2	Eight	Two	Two	Desktop	17.2x16.6x6.2	Yes	$2,399-$4,599
Grid Systems Corp. (415) 656-4700	Gridcase 1530	80386	12.5	MS-DOS, Xenix	1-8	1.4-40	None	One	One	Portable	15x11.5x2.3	No	$4,695
	Gridcase 1520	80286	10	MS-DOS	1-8	1.4-40	None	One	One	Portable	15x11.5x2.3	No	$3,495
	Gridlite Plus 1040	8086	4.77/8	MS-DOS	128K-640K	1.4-20	None	One	One	Portable	11x13	No	$1,950-$4,700
Hewlett-Packard Co. (800) 752-0900	HP Vectra RS/16 PC	80386	16	Vectra DOS, OS/2, SCO Xenix 386	1-16	40-310	Eight	One	One	Desktop	8.4x20x24	Yes	$5,995-$7,395
	HP Vectra RS/20 PC	80386	20	Vectra DOS, OS/2, SCO Xenix 386	1-16	40-310	Eight	One	One	Desktop	8.4x20x24	Yes	$6,595-$13,095
	HP Portable Vectra CS	80C86	7.16	Vectra DOS	640K-6	1.44	Four	None	One	Portable	16.5x13.9x3.5	No	$2,495
	HP Portable Vectra CS Model 20	80C86	7.16	Vectra DOS	640K-6	20	Four	None	One	Portable	16.5x13.9x3.5	No	$3,675
	HP Vectra CS PC	8086	7.16	Vectra DOS	640K-8	360K-20	Seven	One	One	Desktop	18.4x7.8x1.4	No	$1,195-$2,295
	HP Vectra ES PC	80286	8	Vectra DOS	640K-8	1.44-40	Seven	One	One	Desktop	18.4x7.8x1.4	Yes	$2,395-$3,195
	HP Vectra ES/12	80286	8, 12	Vectra DOS	640K-8	1.44-40	Seven	One	One	Desktop	18.4x7.8x1.4	Yes	$2,795-$3,995
Honeywell-Bull (617) 895-6000	AP-M	80286	10	MS-DOS	640K-8.6	20-80	Seven	One	One	Desktop	16.5x16.5x6.0	Yes	$1,895-$3,295
	AP-X	80286	10	MS-DOS	640K-8.6	30-116	Eight	One	One	Desktop	21.8x16.54x6.14	Yes	$2,950-$5,745
	SP	80386	16	MS-DOS	2-8	30-116	Eight	One	One	Desktop	21.18x16.54x6.14	Yes	$4,950-$8,745
Hyundai Electronics America (800) 544-7808	Super 16T	8088-2	4.77, 8	MS-DOS	640K-640K	30	Six	One	One	Portable	15x15.6x5.5	NP	$900-$1,400
	Super 16TE	8088-1	4.77, 10	MS-DOS	640K	NP	Five	One	One	Portable	15x15.6x5.5	NP	$1,045-$1,645
	Super 286C	80286	8-10 MHz	MS-DOS	640K-1	NP	Six	One	One	Portable	16.5x16.5x6.2	NP	$1,645-$2,545
	Super 286	80286	8-10 MHz	MS-DOS, Unix	640K-1	NP	12	One	One	Portable	21.25x16.75x6.25	NP	$1,995-$2,995
IBM (914) 934-4000	Personal System/2 Model 50 Z	80286	10	MS-DOS, OS/2	1-16	30-60	Three	One	One	Desktop	14.2x16.5x5.5	Yes	$3,995-$4,595
	Personal System/2 Model 60	80286	10	MS-DOS, OS/2	1-16	44-185	Seven	One	One	Floorstanding	6.5x19x23.5	Yes	$5,295-$5,795
	Personal System/2 Model 70 386	80386	16, 20, 25	MS-DOS, OS/2	1-16	60-614	Three	One	One	Desktop	14.2x16.5x5.5	Yes	$5,995-$11,295
	Personal System/2 Model 80 386	80386	16, 20	MS-DOS, OS/2	1-16	44-614	Seven	One	One	Floorstanding	6.5x19x23.5x	Yes	$6,995-$11,995
Intel Corp. (800) 528-0595	System 301Z	80386	16	MS-DOS, OS/2, Xenix, Unix	2-16	40	Eight	One	One	Desktop	17.3x21.3x6.5	Yes	$4,119-$6,279
	System 302	80386	25	MS-DOS, OS/2, Xenix, Unix	2-24	40	Eight	Two	One	Desktop	18.7x21.3x6.4	Yes	$7,149-$11,799
Kaypro Corp. (619) 481-4300	Kaypro PC	8088, V-20	4.77, 10	MS-DOS	768K	360K	Nine	One	One	Desktop	19.5x16x5.5	No	$1,645
	Kaypro PC Workstation	8088, V-20	4.77-8	NP	256K-768K	NP	Nine	None	One	Desktop	19.5x16x5.5	No	$1,049
	Kaypro PC/30	8088, V-20	4.77, 10	MS-DOS	768K	360K	Nine	One	One	Desktop	19.5x16x5.5	No	$1,745
	Kaypro 2000+	80C88, V20	4.77, 8.0	MS-DOS	768K	720K	NP	One	One	Portable	13x11.6x3.5	No	$2,795
	Kaypro 286 Model A	80286	6, 12	MS-DOS	1-16	1.2	Eight	One	One	Desktop	21.25x17x6.4	Yes	$1,795

Multiuser bit-mapped graphics are the way of the future.



Make sure you don't get left in the dark.



Unretouched photo of EGA screens; SunRiver Stations running off COMPAQ Deskpro 386/20

Make the LightConnection

Speed 386 graphics to every desktop with SunRiver.

At last, you can extend the power of a single 386 microcomputer throughout your workgroup, putting colorful bit-mapped graphics at each user's fingertips—without spending a fortune.

How? With the LightConnection from SunRiver Corporation. It increases the return on your 386 investment by spreading 386 power and speed throughout your department, for computer-aided design, desktop publishing, personal productivity, or any of a growing number of graphics-oriented applications.

You make the LightConnection with SunRiver's Fiber Optic Host Adapter, which simply plugs into a 386 host such as the COMPAQ Deskpro 386 and speeds its power along a highly reliable fiber optic link to as many as four SunRiver Fiber Optic Stations. With multiple SunRiver Host Adapters, each 386 can support up to 16 connected Fiber Optic Stations, offering a powerful, cost-effective, shared-processor multiuser solution.

When you make the LightConnection, information sharing and sophisticated graphics capabilities are virtually instantaneous. For the first time, bit-mapped DOS graphics—everything from Lotus 1-2-3 to desktop publishing programs like Ventura to AutoCAD—run under UNIX/XENIX as well as multiuser DOS. Popular applications that once were limited to the 386 console—including XENIX programs like SCO Professional, ARRIS and Innovative SmartWare graphics—are now at every desktop.

Protect your PC investment: the SunRiver PC LightCard.

If you currently own stand-alone PCs, XTs or ATs, don't worry, you aren't left in the dark. The SunRiver PC LightCard gives you all the information sharing and multiuser graphics that 386 power provides.

The PC LightCard fits into any 8-bit slot in your PCs, XTs or ATs and connects them by fiber optic link to the SunRiver Host Adapter in the 386.

When you make the LightConnection with the PC LightCard, you increase the return on your 386 investment and protect your PC investment while upgrading your equipment to a high-performance multiuser system. Your users enjoy the powerful multitasking applications of the 386 host while keeping their own familiar units and applications.

An easy connection.

The LightConnection is an easy one thanks to the plug-and-play simplicity of preterminated fiber optic cables. Installation usually is just a matter of minutes.

Plus, SunRiver's central upgrade point greatly eases security control and system maintenance as it diminishes the threat of obsolescence.

Designed around industry-standard processors and operating systems, the SunRiver System easily fits into your existing corporate environment and growth strategy.

These are registered or unregistered trademarks of the following companies:

SunRiver Corporation with its logo is a registered trademark of SunRiver Corporation; Jackson, MS; 80386, Intel Corporation; COMPAQ Deskpro 386/20, COMPAQ Computer Corporation; Lotus 1-2-3, Lotus Development Corporation; Ventura, Ventura Software, Inc.; AutoCAD, Autodesk, Inc.; SmartWare, Informix Software, Inc.; SCO Professional, The Santa Cruz Operation; UNIX AT&T; XENIX, Microsoft Corporation; XT, AT, International Business Machines; ARRIS, Sigma Designs.

Don't be left in the dark. Call for a demo.

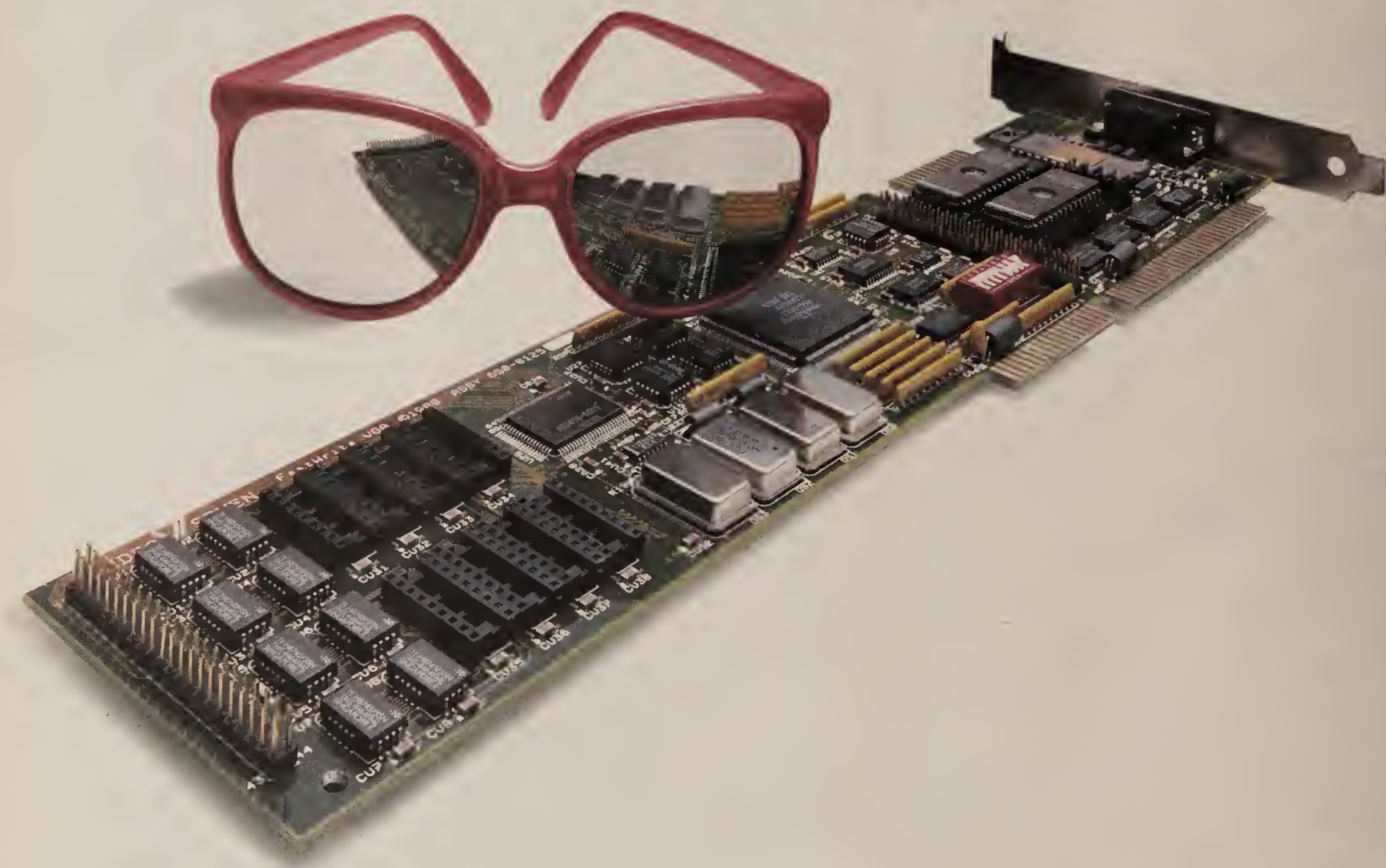
To appreciate the full beauty and power of the LightConnection, you must see a demonstration. For the name of the reseller nearest you or to schedule a demo, please call. **1-800-635-8069**

Reseller inquiries are welcome.

SunRiver
CORPORATION

Light Years Ahead

Some People Buy FastWrite VGA™ For Its Blinding Speed.



And then again, some people buy it for its high resolution. Or its 100% hardware compatibility.

But whatever you buy it for, FastWrite VGA is guaranteed to give you VGA performance like you've never seen before. Because FastWrite VGA outperforms all competitive VGA boards. Pure and simple.

You see, this powerhouse surpasses standard IBM VGA in both color and resolution. Which means you get resolution up to 800 x 600 with 16 colors, or 640 x 400 with 256 colors.

We even offer a 256K memory upgrade that gives you 640 x 480 with 256 colors and our exclusive non-interlaced 1024 x 768 with 4 colors.

And not only is FastWrite VGA 100% register level compatible, it's also the only VGA solution that's form factor compatible. It has the same daughter card connectors as the IBM PS/2 Display Adapter, to accommodate hardware add-ons in the future.

What's more, your current VGA software—or any you plan to buy—is guaranteed to run on FastWrite VGA. Even OS/2 products. It's backwards compatible with EGA, CGA, MDA and Hercules modes. So all your software will run faster than ever before.

Of course once you buy, you get free technical support, guaranteed VGA compatibility and a full five-year warranty. All for a price that won't leave you staring blindly into your wallet.

So visit your local dealer and find out more about FastWrite VGA.

We guarantee that you'll see the difference.

VIDEO SEVEN

46335 Landing Pkwy., Fremont, CA 94538. (415) 656-7800.

The following are registered and unregistered trademarks of the companies listed: FastWrite VGA, Video Seven Inc.; PS/2, Display Adapter, International Business Machines Corporation; Variable frequency monitor required for greater than 640 x 480 resolution. Monitor capable of 48 KHz needed for 1024 x 768. Video Seven reserves the right to change specifications without notice.

COMPANY	PRODUCT NAME	CPU (MICROPROCESSOR)	CLOCK SPEED (IN MHZ)	OPERATING SYSTEM	INTERNAL MEMORY RANGE (MEGABYTES)	DISK STORAGE RANGE (MEGABYTES)	NUMBER OF EXPANSION SLOTS	NUMBER OF SERIAL PORTS	NUMBER OF PARALLEL PORTS	DESKTOP OR PORTABLE	FOOTPRINT (IN INCHES)	SUPPORTS OS/2	SYSTEM PRICE
Kaypro Corp. (619) 481-4300	Kaypro 286	80286	6, 12	MS-DOS	1-16	1.2	Nine	One	One	Desktop	19.5x16x15.5	Yes	$3,295
	Kaypro 286 C	80286	6, 12	MS-DOS	1-16	40	Eight	One	One	Desktop	21.25x17x6.4	Yes	$3,095
	Kaypro 286-16	80286	8, 10, 16	MS-DOS	1-16	1.2-40	Nine	One	One	Desktop	19.5x16x15.5	Yes	$3,795
	Kaypro 386 Model A	80386	16	MS-DOS	512K-16	1.2	Eight	One	One	Desktop	21.25x17x6.4	Yes	$4,195
Lanier Business Systems, a Division of Harris Corp. (404) 270-2406	88/10	8088	10	MS-DOS	640K-640K	20-60	Seven	One	One	Desktop	18x16.25x7	No	NP
	286/10	80286	10	MS-DOS	640K-8	20-130	Eight	Optional	Optional	Desktop	18x16.25x7	Yes	NP
	386/16	80386	16	MS-DOS	1-16	20-130	Eight	Optional	Optional	Desktop	18x16.25x7	Yes	NP
Leading Edge Hardware Products, Inc. (617) 828-8150	Leading Edge Model D	8088-2	4.77, 7.17	MS-DOS	512K-768K	320K-65	Four	One	One	Desktop	14x15.5x5.5	No	$995-$1,995
	Leading Edge Model D2	80286	6, 8, 10	MS-DOS, OS/2	640K-1	1.2-65	Six	One	One	Desktop	16x15.5x6.1	Yes	$1,495-$2,495
MAI/Basic Four, Inc. (714) 731-5100	MAI 1200	80286	8, 10	MS-DOS	512K-1	2.88-20	Six	Two	One	Desktop	15x15x4.5	Yes	$1,895- $2,895
NCR Corp. (800) 544-3333	NCR PC 6	8088-2	4.77, 8	NCR-DOS	256K-640K	360K-20	Eight	One	One	Desktop	15x19.5x5.5	Yes	$1,450-$3,040
	NCR PC 710	80286-10	6, 10	NCR-DOS, OS/2, Xenix	640K-4	20-40	Eight	One	One	Desktop	NP	Yes	$1,954-$3,520
	NCR PC 810	80286-10	6, 10	NCR-DOS, OS/2, Xenix	640K-16	20-70	Six	One	One	Desktop	16.54x21.18x6.14	Yes	$2,950-$5,050
	NCR PC916	80386	4.77, 16	NCR-DOS, OS/2, NCR 386/ix, Xenix	2-8	30-115	Eight	One	One	Desktop	16.54x31.18x6.14	Yes	$4,995-$8,453
NEC Information Systems, Inc. (508) 264-8000	Business Mate	80286	10	Xenix System V	640K-8.6	40-66	Eight	Two	One	Desktop	6.3x17.4x23.7	Yes	$4,995-$5,995
	Business Mate 386	80386	16	SCO Xenix 386	2-16	40-130	Eight	Two	One	Desktop	6.3x17.4x23.7	Yes	$5,945-$8,545
	Power Mate 1	80286	8, 10	MS-DOS, OS/2	640K-10.6	20-80	Seven	One	One	Desktop	16.5x16.5x6.3	Yes	$1,999-$4,495
	Power Mate 1 Plus	80286	12	MS-DOS, OS/2	640K-16	42-140	Seven	One	One	Desktop	16.5x16.5x6.3	Yes	$2,595-$5,295
	Power Mate 2	80286	8, 10	MS-DOS	640K-10.6	NP	Eight	Two	One	Desktop	21.2x16.5x6.3	Yes	$2,595-$4,195
	Power Mate Portable	80286	810	MS-DOS, OS/2	640K-4.6	20-40	Three	One	One	Portable	15.2x6.9x11.2	Yes	$3,995-$4,695
	Power Mate 386	80386	16	MS-DOS, OS/2	2-16	40-130	Eight	Two	One	Desktop	21.2x16.5x6.3	Yes	$4,395-$6,995
	Power Mate 386/20	80386	20	MS-DOS, OS/2	2-16	42-300	Eight	Two	One	Desktop	21.2x16.5x6.3	Yes	$5,795-$9,995
	Power Mate Portable SX	80386 SX	16	MS-DOS, OS/2	2-16	42-42	Three	One	One	Portable	15.2x6.9x11.2	Yes	$6,595
	Power Mate SX	80386 SX	16	MS-DOS, OS/2	2-16	42-140	Six	One	One	Desktop	16.5x16.5x6.3	Yes	$4,495-$5,995
Nixdorf Computer Corp. (617) 890-3600	8810 Model 45	80286	10	MS-DOS, Xenix	640K-8	40-80	Three	One	One	Desktop	13.6x18x5.25	Yes	$1,895-$2,995
	8810 Model 55	80286	10	MS-DOS, Xenix, OS/2	640K-16	40-80	Six	One	One	Desktop	21.18x16.5x6.1	Yes	$2,595-$3,295
Olivetti USA (201) 526-8200	M290	80286	12	MS-DOS, Xenix, OS/2	1-16	40-100	Eight	One	One	Desktop	NP	Yes	NP
	M380 XP1	80386	20	MS-DOS, Xenix, OS/2	1-48	80	Seven	One	One	Desktop	NP	Yes	NP
	M380 XP3	80386	20	MS-DOS, Xenix, OS/2	2-48	135	Seven	One	One	Desktop	NP	Yes	NP
	M380 XP5	80386	20	MS-DOS, Xenix, OS/2	4-48	135-600	10	One	One	Desktop	NP	Yes	NP
Prime Computer (508) 655-8000	PRIME EXL 320	80386	20	MS-DOS, Pick, Unix, SVID-compliant	4, 16	More than 1 G	Seven	114	None	Desktop	7.5x15x25	No	$17,900
	PRIME EXL 325	80386	25	MS-DOS, Pick, Unix, SVID-compliant	4, 16	More than 1G	Seven	114	None	Desktop	7.5x15x25	No	$38,900
Proteus Technology Corp. (800) 782-8387	Proteus 286E	80286	10	MS-DOS, Unix, Xenix, Novell, OS/2	640K-16	700	Eight	Two	One	Desktop	21.3x17x6.8	Yes	$1,195
	Proteus 286GTX	80286	12	MS-DOS, Unix, Xenix, Novell, OS/2, Pick, Theos	640K-16	700	Eight	Two	One	Desktop	21.3x17x6.8	Yes	$1,395
	Proteus 286/20	80286	20	MS-DOS, Unix, Xenix, Novell, OS/2, Pick, Theos	1024K-16	700	Eight	Two	One	Desktop	21.3x17x6.8	Yes	$1,695
	Proteus 386A	80386	16	MS-DOS, Unix, Xenix, Novell, OS/2, Pick, Theos	1024K-16	700	Eight	Two	One	Desktop	21.3x17x6.8	Yes	$2,295
	Proteus 386B	80386	16, 20	MS-DOS, Unix, Xenix, Novell, OS/2, Pick, Theos	1024K-16	NP	Eight	Two	One	Desktop	21.3x17x6.8	Yes	$2,195
	Proteus 386/25GT	80386	25	MS-DOS, Unix, Xenix, Novell, OS/2, Pick, Theos	1024K-16	700	Eight	Two	One	Desktop	21.3x17x6.8	Yes	$4,795
Sanyo Business Systems (201) 440-9300	MBC-16LT	80C88	4.7, 8	MS-DOS	640K-640K	720K-720K	None	One	One	Portable	11.4x12.6x2.44	No	$1,599
	MBC-16EX	8088-2	4.7, 8	MS-DOS	640K-640K	360K-720K	Three	One	One	Desktop	13.4x13.4x6.12	No	$869
	MBC-17 Plus	80286	6, 10	MS-DOS	1-1	1.2-1.2	Five	One	One	Desktop	12.75x16.25x16.75	No	$1,799
	MBC-18 Plus	80386	16	MS-DOS	1	1.2-1.2	Five	One	One	Desktop	12.75x16.25x6.75	No	$3,499
Sharp Electronics Corp. (201) 529-9500	PC-4501	80188	7.16	MS-DOS	256K-640K	1.2	720K	One	One	Portable	12.125x13.75x3	No	$995
	PC-4502	80188	7.16	MS-DOS	640K-1.6	1.44	NP	One	One	Portable	12.125x13.75x3	No	$1,795
	PC-4502M	80188	7.16	MS-DOS	640K-1.6	1.44	NP	One	One	Portable	12.125x13.75x3	No	$1,995
	PC-4521	80188	7.16	MS-DOS	640K-1.6	20	NP	One	One	Portable	12.125x13.75x3	No	$2,995
	PC-4521M	80188	7.16	MS-DOS	640K-1.6	20	NP	One	One	Portable	12.125x13.75x3	No	$3,195
	PC-7202	80286	10	MS-DOS	640K-1.6	1.44	One	One	One	Portable	16.125x6.25x9.75	NP	$2,995
	PC-7221	80286	10	MS-DOS	640K-1.6	20	One	One	One	Portable	16.125x6.25x9.75	NP	$3,995
	PC-7241	80286	10	MS-DOS	640K-1.6	40	One	One	One	Portable	16.125x6.25x9.75	NP	$4,495
Tandon Corp. (805) 523-0340	PCX-2	8088	4.77	MS-DOS	256-640	NP	Six	Optional	One	Desktop	18.9x15.2x5.5	No	$1,099
	PCX-20	8088	4.77	MS-DOS	640K-640K	NP	Six	Optional	One	Desktop	18.9x15.2x5.5	No	$1,499
	PCA-1	80286	6, 8	MS-DOS	1-1	NP	Eight	One	One	Desktop	21.1x16.3x6.3	No	$1,799
	PCA-1 Plus	80286	8, 10	MS-DOS	1-1	NP	Eight	One	One	Desktop	21.1x16.3x6.3	No	$2,099
	PCA-20	80286	6, 8	MS-DOS	1-1	NP	Eight	One	One	Desktop	21.1x16.3x6.3	No	$2,299
	PCA-20 Plus	80286	8, 10	MS-DOS	1-1	NP	Eight	One	One	Desktop	21.1x16.3x6.3	No	$2,699
	PCA-40	80286	6, 8	MS-DOS	1-1	NP	Eight	One	One	Desktop	21.1x16.3x6.3	No	$2,899
	PCA-40 Plus	80286	8, 10	MS-DOS	1-1	NP	Eight	One	One	Desktop	21.1x16.3x6.3	No	$3,299

COMPANY	PRODUCT NAME	CPU (MICROPROCESSOR)	CLOCK SPEED (IN MHZ)	OPERATING SYSTEM	INTERNAL MEMORY RANGE (MEGABYTES)	DISK STORAGE RANGE (MEGABYTES)	NUMBER OF EXPANSION SLOTS	NUMBER OF SERIAL PORTS	NUMBER OF PARALLEL PORTS	DESKTOP OR PORTABLE	FOOTPRINT (IN INCHES)	SUPPORTS OS/2	SYSTEM PRICE
Tandon Corp. (805) 523-0340	PCA-70 Plus	80286	8, 10	MS-DOS	1-1	NP	Eight	One	One	Desktop	21.1x16.3x6.3	No	$4,099
	Targa 1	80286	6, 8	MS-DOS	1-5	NP	Five	One	One	Desktop	12.6x15.7x6.3	No	$1,999
	Targa-1 Plus	80286	8, 10	MS-DOS	1-5	NP	Five	One	One	Desktop	12.6x15.7x6.3	No	$2,399
	Targa-20	80286	6, 8	MS-DOS	1-5	NP	Five	One	One	Desktop	12.6x15.7x6.3	No	$2,299
Targa-20 Plus		80286	8, 10	MS-DOS	1-5	NP	Five	One	One	Desktop	12.6x15.7x6.3	NP	$2,699
	Targa-40	80286	6, 8	MS-DOS	1-5	NP	Five	One	One	Desktop	12.6x15.7x6.3	NP	$2,899
	Targa-40 Plus	80286	8, 10	MS-DOS	1-5	NP	Five	One	One	Desktop	12.6x15.7x6.3	NP	$3,299
	PAC 286	80286	6, 8	MS-DOS	1-5	NP	Five	One	One	Desktop	12.6x15.7x6.3	No	$2,799
	PAC 286 Plus	80286	8, 10	MS-DOS	1-5	NP	Five	One	One	Desktop	12.6x15.7x6.3	No	$3,199
	Tandon 386	80386	20	MS-DOS	2-8	NP	Eight	One	One	Desktop	21.1x16.3x6.3	Yes	$9,499
Tandy Corp. (817) 390-3011	Tandy 102	80C85	2.4	Proprietary	32K-32K	NA	NA	One	One	Portable	11.9x5.5x1.5	No	$599
	Tandy 1400 LT	NEC-V20	7.16, 4.77	MS-DOS	768K-768K	720K-720K	One	One	One	Portable	14.5x12.4x3.5	No	$1,799
	Tandy 1000 TL	80286	8, 4	MS-DOS	640K-768K	720K-40	Five	One	One	Desktop	5.1x15.5x13.1	No	$1,299-$1,368.95
	Tandy 1000 SL	8086	8, 4	MS-DOS	384K-640K	360K-40	Five	One	One	Desktop	5.1x15.5x13.1	No	$899-$1,028.95
	Tandy 1000 HX	8088-2	7.16, 4.77	MS-DOS	256K-640K	720K-720K	Three	None	One	Desktop	17x14.5x3.4	No	$699-$978.90
	Tandy 3000 NL	80286	10	MS-DOS, OS/2	512K-16	1.44-344	Seven	One	One	Desktop	15.75x17x6.25	Yes	$1,699-$3,748
	Tandy 4000	80386	16	MS-DOS, OS/2, SCO Xenix 386	1-16	1.44-344	Eight	One	One	Desktop	19x18x6.5	Yes	$2,599-$5,647
	Tandy 4000 LX	80386	20	MS-DOS, OS/2, SCO Xenix 386	2-16	1.44-344	Eight	One	One	Desktop	19x18x6.5	Yes	$3,999-$8,048
	Tandy 5000 MC	80386	20	MS-DOS, OS/2, SCO Xenix 386	2-16	1.44-344	Seven	One	One	Desktop	6.8x17x15.5	Yes	$4,999-$6,999
Televideo Systems, Inc. (408) 745-7760	Teloas II	80286	12	MS-DOS	1-4	Up to 150	Eight	Two	One	Desktop	16x16x6	Yes	$2,399-2,799
	Teloas III	80386	16	MS-DOS	1-16	Up to 300	12	Two	One	Desktop	21x16x6	Yes	$3899-5,399
Toshiba America, Inc. (714) 583-3000	T1200F	80C86	9.54, 4.77	MS-DOS	1	Two 720K disktette drive	One	One	One	Portable	12.2x12x2.6	No	$2,399
	T1200HB	80C86	9.54, 4.77	MS-DOS	1	720K-20	One	One	One	Portable	12.2x12x3.0	No	$3,699
	T1200H	80C86	9.54, 4.77	MS-DOS	1	720K-20	One	One	One	Portable	12.2x12x2.6	No	$3,499
	T1200FB	80C86	9.54, 4.77	MS-DOS	1	Two 720K disktette drive	One	One	One	Portable	12.2x12x3.0	No	$2,599
	T3200	80286	6, 12	MS-DOS	1-4	720K-40	Two	One	One	Portable	14.6x15.6x3.9	No	$5,799
	T5100	80386	8, 16	MS-DOS	2-4	1.44-40	One	One	One	Portable	12.2x14.2x3.5	No	$7,499
	T3100/20	80286	4, 8	MS-DOS	640K-2.6	740K-20	One	One	One	Portable	12.2x14.2x3.1	No	$4,699
	T1000	80C88	4.77	MS-DOS	512K-1.2	740K	One	One	One	Portable	12.2x11x2.05	No	$1,249
Unisys Corp. (215) 542-2240	PW Series 300	80286	6, 10	MS-DOS, OS/2	640K-1.64	720K-1.44	Two	NP	NP	Desktop	15x15.7x4	Yes	$1,305-$2,380
	PW Series 500	80286	6, 8, 12	MS-DOS, Xenix System V, Novell, GW Basic	640K-4.64	NP	Two	NP	NP	Desktop	15x15x4	Yes	$2,795-$4,885
	PW Series 800	80386	16, 20	MS-DOS, Xenix System V, Novell, GW Basic	1-8	NP	Four	NP	NP	Desktop	21x17x5.5	No	$5,080-$5,580, $7,885-$8,385
	PW Series 850	80386	16	MS-DOS, Xenix System V, Novell, GW Basic	1-8	NP	Four	NP	NP	Desktop	22.9x16.8x6.8	No	$5,080-$7,885
Wang Laboratories, Inc. (800) 522-9264	Wang PC 240	80286	6, 8, 10	MS-DOS	640K-640K	20-42	Four	One	One	Desktop	17.0x14.75x5.0	Yes	$2,125
	Wang PC 280	80286	6, 8, 10	MS-DOS	640K-640K	34-137.2	Eight	One	One	Desktop	16.25x21.38x6.63	Yes	$3,850
	Wang PC 380	80386	8, 16	MS-DOS	512K-512K	137.2	Eight	One	One	Desktop	16.25x21.38x6.63	Yes	$6,495
Wyse Technologies, Inc. (408) 433-1000	WY-2108	80286	8	MS-DOS	512K-1	20	Seven	One	One	Desktop	15x16.6x6.2	Yes	$1,899-$2359
	WY-2200	80286	10	MS-DOS	640K	40	Eight	One	One	Desktop	21.1x17.9x6.4	Yes	$2,299-$3,359
	WY-2112	80286	12	MS-DOS	1-1	40	Seven	One	One	Desktop	15x16.6x6.2	Yes	$2,899-$3,959
	WY-2214	80286	12.5	MS-DOS	1-1	40	Nine	Two	One	Desktop	21.1x17.9x6.4	Yes	$3,199-$4,259
	WY-3216	80386	16	MS-DOS	1-8	150	Nine	Two	One	Desktop	21.1x17.9x6.4	Yes	$4,399-$7,999
Zenith Data Systems Corp. (800) 842-9000	SupersPort Model 2	CMOS 80C88	4.77, 8	MS-DOS	640K-1.64	720K	Three	One	One	Portable	12.2x12.2x3.1	No	$2,399
	SupersPort Model 20	CMOS 80C88	4.77-8	MS-DOS	640K-1.64	720K-20	Three	One	One	Portable	12.2x12.2x3.1	No	$3,599
	SupersPort Model 40	80286	6-12	MS-DOS	1-2	1.4-40	Three	One	One	Portable	12.2x12.2x3.1	Yes	$5,599
	SupersPort 286 Model 20	80286	6-12	MS-DOS	1-2	1.4-20	Three	One	One	Portable	12.2x12.2x3.1	Yes	$4,999
	Z-159 Model 3	8088	4.77, 8	MS-DOS	640K-1.2	360K-20	Five	One	One	Desktop	16x6.25x16.5	NP	$2,199
	Z-159 Model 13	8088	4.77, 8	MS-DOS	640K-1.2	360K-20	Five	One	One	Desktop	16x6.25x16.5	NP	$2,499
	Z-286 LP	80286	8	MS-DOS	1-6	1.4-40	Three	Two	One	Desktop	14x15x3.88	NP	$3,999
	Z-248/12 Model 40	80286	12	MS-DOS, Xenix	1-6	1.4, 3.5, 40	Four	Two	One	Desktop	21x16.5x6.5	Yes	$4,799-$6,799
	Z-248/12 Model 80	80286	12	MS-DOS, Xenix	1-6	1.4, 3.5, 80	Four	Two	One	Desktop	21x16.5x6.5	Yes	$4,799-$6,799
	Z-248/12 Model 160	80286	12	MS-DOS, Xenix	1-6	1.4, 3.5, 160	Four	Two	One	Desktop	21x16.5x6.5	Yes	$4,799-$6,799
	TurbosPort 386	80386	6-12	MS-DOS	2-3	1.4-40	Two	One	One	Portable	31.25x14.75x4.75	Yes	$7,999

How the charts work

The charts for the Hardware Roundup, which began with large, medium-scale and special-purpose systems on Sept. 19, are intended as a guide for readers who are interested in comparing products from major vendors in various size and price classes.

Computerworld has tried to present complete, accurate listings of as many products as possible, contacting vendors directly for information. Space does not permit inclusion of all products or vendors in each category.

In some cases, vendors' figures reflected an overlap in number of users from one category to another. Where possible, the parameters used to group computer systems with their likely competitors were defined in the following manner:

- **Personal computers** are microprocessor-based single-user systems for business use.
- **Workstations** are single-user systems used primarily for technical and engineering purposes.
- **Small systems** support two to 120 users and cost from $10,000 to $100,000.
- **Medium systems** support 50 to 300 users and are priced in the $100,000 to $1 million range.
- **Large systems** support 125 to more than 1,000 users and cost more than $1 million.

CW has tried to be as comprehensive as possible in gathering the information presented. Comparing computers made by different vendors, or even within a single company in the cases of multiproduct-line companies, has never been easy. Many who evaluate systems are looking for a set of numbers showing how all types of computers handle a particular, well-defined set of tasks.

In the absence of such a set of numbers, the latest edition of CW's annual Hardware Roundup includes millions of instructions per second — either provided by vendors or, based on vendors' claims, estimated by CW — and other performance numbers, such as memory and storage capacities, supplied by vendors in response to a questionnaire. •

Minisupers are the new kids in town

BY NELL MARGOLIS and JULIE PITTA

WORKSTATIONS

A riveting battle of East and West start-ups enlivened the workstation territory this year as Sunnyvale, Calif.-based Ardent Computer Corp. and Newton, Mass.-based Stellar Computer, Inc. attempted to blast out a fresh market niche. In March, both companies wedded super-speed computing to high-voltage graphics to produce what has come to be known as the minisuper workstation.

What made the competition particularly interesting was the fact that the companies, both venture capital-backed start-ups headed by seasoned computer entrepreneurs, took different technological paths to strikingly similar ends.

Ardent's four-model Titan line is built largely on third-party technology: a Mips Computer Systems, Inc. reduced instruction set computing (RISC) processor, used in combination with a custom-made vector processor, and a Silicon Graphics, Inc. board set. Titan's might is gauged at 40 million instructions per second (MIPS) integer and 64 million floating-point operations per second (MFLOPS) peak, according to Ardent.

Stellar's GS1000, designed in-house, harnesses 45 application-specific integrated-circuit CMOS microprocessors to yield 25 MIPS integer and 40 MFLOPS double-precision, according to Stellar. Industry watchers say the two systems look similar.

Both the Titan and the GS1000 are priced at less than $100,000 — less than half the price users would have to pay for minisupers offering comparable computing power.

And they're not alone. Apollo Computer, Inc. has already put one foot into the new market niche with its Domain 10000/Prism Architecture announcement. By year's end, analysts expect entries by Sun Microsystems, Inc. and Silicon Graphics, Inc. as well.

Silicon Graphics defended its niche, the market for three-dimensional graphics workstations, as other vendors eyed the arena. Silicon Graphics added a high-end workstation — expected to compete with the Ardent and Stellar class of machines — and hinted that it would introduce a $15,000 3-D graphics workstation before the end of the year. A low-end system would give Silicon Graphics a complete range of 3-D graphics workstations.

For a niche that didn't exist at this time last year, the minisuper corner is getting crowded fast.

It's there, but . . .

"The market for these machines really is out there," says John Logan, executive vice-president of the Aberdeen Group, a Boston-based market research firm. The question is, how big is it? Vicki Brown, director of systems research at Framingham, Mass.-based International Data Corp., says, "We never expect [the minisuper workstation niche] to exceed 5% of the total market. The number of users who can pay the price for the power are limited."

High-end users such as scientists, engineers and researchers who need — but formerly couldn't afford — super or minisupercomputer power currently make up the bulk of the minisuper workstation customer base. While the workstation vendors all talk about extending into commercial applications — finance and architecture, for instance — most analysts believe that it will be a long time before the minisuper workstation moves beyond technical markets.

On the other hand, as IDC's Brown points out, while the number of potential sales is limited, each sale is a big-ticket item. A successful minisuper workstation offering, she says, will be a good profit-maker for its manufacturer.

"We're going to see about 18 months of Ardent and Stellar pumping these machines into the pipeline," Logan says. "What comes after 18 months? That's hard to say. But in the meantime, the winner is going to be the end user."

Apollo seemed ready to emerge from the shadow of archrival Sun Microsystems, Inc. Then, the Chelmsford, Mass.-based firm, generally credited with creating the workstation market, crashed into a wall of corporate woes that riveted Wall Street and left industry analysts divided in their opinions about the company's future.

The early March announcement of the Domain 10000, the 60-MIPS flagship of Apollo's parallel reduced instruction set multiprocessing (PRISM) architecture, was hailed as a technological milestone.

It was also a marketing coup — a far less frequent occurrence at Apollo, analysts agree — giving Apollo the first entry (if only by hours) in the emerging

Margolis is a *Computerworld* senior writer. Pitta is *Computerworld*'s West Coast senior correspondent.

WHY DO SEVEN OF THE "BIG EIGHT" ACCOUNTING FIRMS CHOOSE REALIA COBOL?

Why Realia? Simple. Because we can help the best *stay* the best.

Realia COBOL is the fastest, most advanced application development tool available to bring the power of the mainframe right to your PC. You'll start saving time, money, and resources, whether you're maintaining an old system or creating a new one.

Realia COBOL offers your programmers the quickest compilation and the biggest file capacity of any PC compiler. A 10,000-line program compiles in 76 seconds. A 10,000-record sort takes 43 seconds. Best of all, Realia-compiled programs execute faster than any other PC compiler's. With RealCICS®, you can even handle online CICS programs.

At Realia, we also offer you something that has become a bit of a contradiction in terms: genuine support for a micro software product.

Realia COBOL—simply the best choice.

REALIA®

10 South Riverside Plaza, Chicago, IL 60606 • (312) 346-0642 • Telex 332979

minisuper workstation niche.

The next month, Apollo slashed the prices on its Series 4000 "personal super workstation" in order to be able to offer a 4-MIPS machine at prices starting below $9,000.

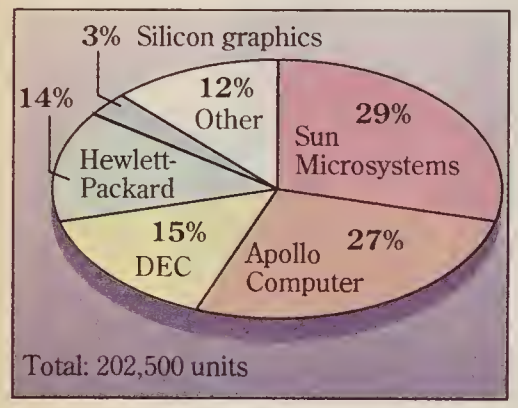
In June, the company topped the Series 4000 line with a 2-D graphics model and claimed processing speed increases of as much as 300% across the entire series, courtesy of a floating-point accelerator based on the Weitek, Inc. 3164 floating-point chip.

"It looked like they had it all together," says Richard Shaffer, editor of the New York-based "Technologic Computer Letter." "[Apollo Chairman Thomas] Vanderslice was being carried around on shoulders."

And then the dominoes began to tilt.

Shared labor

Worldwide installations of technical workstations in 1987, by vendor market share



SOURCE: INTERNATIONAL DATA CORP.
CW CHART

Within two weeks in July, the following happened:

- Citing a shortfall in sales by its West German subsidiary and a stateside slackening in the wake of the April price drop, Apollo announced impending second-quarter losses of $5 million to $8 million (the final figure was $7 million); company stock plummeted.
- At least one stockholder immediately filed a class action suit in federal court, charging Apollo with securities fraud in connection with the drastic stock drop.
- Apollo's introduction of the 4-MIPS Series 3500 and the 7-MIPS Series 4500 workstations — the 4500s are the first workstations to incorporate the 33-MHz version of the Motorola, Inc. 68030 chip — was largely overshadowed by continuing questions about the company's management and stability.
- Apollo President Roland Pampel abruptly left the company, and Vanderslice stepped back to the helm.

"Apollo's timing couldn't have been worse," Shaffer says. "Whichever way you look at it, they've made themselves look very foolish; they look like the gang that couldn't shoot straight."

Apollo's stumble is worsened, adds IDC's Brown, by Sun's unbroken forward pace. "Sun is coming on like an avalanche," she says, "and they're only halfway down the hill."

Blinding success

A pact between Sun and AT&T last fall sent shock waves through the workstation industry that are still being felt today. In October, Sun agreed to license its RISC-based scalable processor architecture (Sparc) to AT&T.

At the same time, AT&T announced that it would merge its Unix System V operating system with the Sun operating system, based on the University of California at Berkeley's Unix 4.2.

It didn't take long for AT&T's Unix licensees to respond. By January, AT&T was meeting with angry licensees who charged that AT&T's agreement with Sun gave the aggressive workstation vendor an advantage in the Unix marketplace.

They contended that Unix would be optimized for Sparc and that, as part of the development team for the new version of Unix, Sun could bring workstations to market using the new operating system more quickly than other licensees.

Despite AT&T's efforts to quell their fears, the licensees were not satisfied. Last spring, industry giants IBM, Hewlett-Packard Co., Digital Equipment Corp. and Apollo formed the Open Software Foundation, a not-for-profit company that has as its charter the development of an "open" version of Unix.

Neither the controversy — nor a shortage of DRAMs — slowed Sun as it sped toward a $1 billion year. It added Sparc licensees like Xerox Corp. and Unisys Corp. and continued to expand its own product line. In February, Sun added a desktop version of its Sparc workstation. At the same time, it was forced to raise prices on its line of Motorola 68020-based systems because of the DRAM shortage.

Branch out

In April, Sun launched its long-anticipated Intel Corp. 80386-based systems, which can run Unix and MS-DOS. Sun is hoping the 386I workstations will allow it to branch out into commercial markets from the technical markets in which it has made its name.

In addition to a bad case of Sun-burn and serial self-inflicted foot wounds, Apollo had a new thorn in its side this year: DEC, previously a second-tier player in the workstation market, established itself as a serious contender. If DEC hasn't displaced Apollo as the No. 2 shareholder in the U.S. workstation market as of this moment, "most [market analysts] are predicting that they will by the end of the year," Aberdeen's Logan says.

From its autumn 1987 introduction of the Vaxstation 3200 and 3500 through the February debut of the Vaxstation 8000, DEC has continued to demonstrate

the seriousness of its oft-stated intent to be a ranking workstation supplier.

The Vaxstation 3200 and 3500 — 3-MIPS models based on the CPU used in DEC's Microvax 3500 and 3600 and priced in the $19,000 to $58,000 range — gave the Massachusetts minicomputer mammoth its first substantial footing as a price/performance competitor with the Sun-3/260 and the Apollo DN4000, says IDC's Brown. The new models, she adds, also extended DEC beyond the entry level in the workstation area.

"For the first time, they can say they really have a range of systems," Brown says.

With heightened credibility in standard workstation territory, DEC made a major assault on the high ground with the Vaxstation 8000, a 3-D graphics workstation codeveloped with Salt Lake City-based Evans & Sutherland Computer Corp. Introduced a month before Stellar, Ardent and Apollo launched their minisuper workstations, the 8000 targeted a similar market — scientific and technical users performing such tasks as mechanical computer-aided engineering and molecular modeling — but with a different strategy.

"We're not joining the glamour race — the MIPS race," said DEC President Ken Olsen. "We want to have the machine that people want to use to get work done."

Leaving the forsworn MIPS to be provided by computers to which the Vaxstation 8000 was designed to connect, DEC concentrated on delivering 3-D performance — 500,000 anti-aliased vectors per second, outdistancing Silicon Graphics' record 200,000 and hailed by at least one seasoned market observer as "spectacular."

Moreover, some analysts cite the DEC entry's shaded performance — 5,000 Gouraud-shaded polygons per second — as a potential competitive weakness, in light of Stellar's and Ardent's 100,000 Gouraud-shaded polygons per second.

"DEC has some real problems in the workstation area," Randolph notes. "They have to figure out how to engineer, market and sell a low-margin workstation; traditionally, DEC doesn't do 'small' very well."

Long-suffering HP users received good news in September 1987 when HP announced that it would begin to ship the HP 3000 Series 950 general-purpose system, the high end of HP's Spectrum line. HP's Spectrum systems, based on RISC, were hampered by technical problems with the operating system's I/O, which caused the workstations to be delayed by nearly a year.

At a gathering of HP's users, President and Chief Executive Officer John Young acknowledged that HP would have to be more aggressive in the marketplace against dynamic competitors like DEC.

> "I USED TO LIVE in Texas, and we had this local football team that was always going to be next year's champion. That's the RT."
>
> RICHARD SHAFFER
> "TECHNOLOGIC COMPUTER LETTER"

The wild card

"I used to live in Texas, and we had this local football team that was always going to be next year's champion," says "Technologic Computer's" Shaffer. "That's the RT."

Several rounds of enhancements after its 1986 debut, IBM's entry in the workstation stakes — the RT series, nee the RT Personal Computer — is "still a system looking for a market," said a recent report published by Shearson Lehman Hutton, Inc.

Toward the end of another lackluster year for the RT, however, the computer now estimated by analysts as little more than a blip on IBM's bottom line and in the workstation market began to show some promising signs.

In August, IBM rolled out three new RISC-based RT models equipped with 16M bytes of CMOS memory — four times the former RT complement — and claiming as much as 25% faster processing than its predecessors. While still shy of the high-end performance and attractive price that would make the RT a workstation to contend with, say industry analysts, the June offerings served as evidence of IBM's genuine commitment to the technical workstation marketplace and to AIX, IBM's flavor of Unix.

According to company spokesmen, increased efforts to woo software developers into writing AIX-based programs are afoot at IBM. According to several market analysts, the dearth of applications is an often cited factor in the RT's also-ran status.

"I haven't given up on IBM and the RT," says Charles Foundyller, president of Cambridge, Mass.-based market research firm Daratech. "IBM at the higher levels certainly understands the RT's strategic importance and has shown itself fully capable of acting on that kind of understanding."

Foundyller says he expects to see eight RT models out by the end of this year. "If they can come up with, say, 16 by February or March, everyone will sit up and take notice." •

Let's talk about relational data bases.
But first, find the clown with the red nose, top hat and no balloons.

If you picked the first clown from the right on the top row, you didn't need the help of a relational data base system.

Of course, real-life business problems are considerably more complicated. That's why IBM, the leader in relational data base technology, offers a wide range of products to work with a full range of hardware, from workstations to midrange and mainframe computers.

IBM's data base products can help users in any department retrieve information about as easily as you solved the problem above. They also provide tools for programmers to do their job more efficiently. And that means improved productivity for everyone.

In fact, IBM's DB2 and SQL/DS offer referential integrity, which allows you to maintain data relationships without complex programming. And with application enabling tools such as IBM's Cross Systems Product, you can develop new programs with speed and simplicity. So even as your business needs change, your existing applications and data bases will remain sound investments.

Call 1-800-IBM-2468, ext. 44, for literature or to arrange for an IBM marketing representative—in the blue suit, yellow tie with a black briefcase—to contact you.

IBM The Bigger Picture

© IBM 1988

© 1988 Hyundai Electronics America

The inspiration for our personal computers.

Your basic toaster, circa 1940.

Chances are, someone you know still has one on their counter. Not because they collect vintage appliances. Rather, because it still works well. And does the job it was designed to do. Make good toast.

At Hyundai, we admire this toaster.

It's a stainless example of the kind of no-frills functionality, reliable performance, and enduring design we believe in. And build into everything we make. From our cars to our line of personal computers.

Take our 10 MHz XT-compatible – the Super 16TE. No bells and whistles here. Just dependability you can trust your business to. And technology you can use. Like a choice of 5.25″ or 3.5″ disk drives. It also comes with an integrated software package that has all the programs you may ever need to take care of business.

Like all our compatibles, the Super 16TE is backed by an 18-month warranty. And just the kind of comforting support you'd expect from a $20 billion world class company.

For a computer that will give you good basic value for your bread, see the Super 16TE and our other affordable compatibles today. For the dealer nearest you, call 1-800-544-7808 ext. 300.

HYUNDAI

Practical Compatibles.

Workstations

COMPANY	PRODUCT	CPU (MICROPROCESSOR)	PERFORMANCE IN MIPS	DEDICATED FLOATING-POINT PROCESSOR	MAIN MEMORY RANGE (MEGABYTES)	STORAGE RANGE (MEGABYTES)	OPERATING SYSTEMS	TYPES OF NETWORKS SUPPORTED	GRAPHICS RESOLUTION	SYSTEM PRICE
Apollo Computer, Inc. (617) 256-6600	Series 3000 PC	68020	1.5	68881	4-8	155-696	Unix System V.3, BSD 4.3, Aegis	Token-Ring, Ethernet, Decnet	1,280 x 1,024 and 1,024 x 800 monochrome; 1,024 x 800 color	$4,490-$11,300
	Series 4000 Personal Super Workstation	68020, 25 MHz	4	68020, 25 MHz	4-32	155-696	Unix System V.3, BSD 4.3, Aegis	Token-Ring, Ethernet, Decnet	1,280 x 1,024 and 1.024 x 800 monochrome; 1,024 x 800 color	$8,990-$63,740
	Series 3500 Personal Workstation	68020, 25 MHz	4	68020, 25 MHz	4-32	155-696	Unix System V.3, BSD 4.3, Aegis	Token-Ring, Ethernet, Decnet	1,280 x 1,024 and 1,024 x 800 monochrome; 1,280 x 1,024 and 1,024 x 800 color	$7,990-$62,140
	Series 4500 Personal Super Workstation	68030, 33 MHz	7	68030, 33 MHz	8-32	155-696	Unix System V.3, BSD 4.3, Aegis	Token-Ring, Ethernet, Aegis	1,280 x 1,024 and 1,024 x 800 monochrome; 1,280 x 1,024 and 1,024 x 800 color	$18,990-$69,490
	Series 10000 Personal Supercomputer	RISC[1]-based multiprocessor CPU	15-100	NP	8-128	3G	Unix System V.3, BSD 4.3, Aegis	Token-Ring, Ethernet, AEGIS	NP	$69,900-$139,900
Applied Digital Data Systems, inc. (516) 231-5400	Mentor 6000 series	68020	2-4	No	2-16	4.5G	Pick	Token-Ring	NP	$19,000-$130,000
Control Data Corp. (800) 553-2215	Cyber 910-517	MIPS[2] 8-MHz RISC	7	Yes	8-16	170-9.6G	Unix System V	Ethernet, TCP/IP[3]	1,280 x 1,024 color	$44,900-297,900
	Cyber 910-537	MIPS 12.5-MHz RISC	10	Yes	8-16	170-9.6G	Unix System V	Ethernet, TCP/IP	1,280 x 1,024 color	$59,900-$312,900
	Cyber 910-587	MIPS 16.67- MHz RISC	13	Yes	8-144	170-9.6G	Unix System V.3	Ethernet, TCP/IP	1,280 x 1,024 color	$94,900-400,000+
Convergent Technologies, Inc. (408) 434-2848	Network PC	80286	1.263	Optional	512K-1	40	MS-DOS, Xenix, OS/2	Token-Ring, Banyan Vines, NGEN Cluster, Arcnet	EGA/CGA/Hercules[4]	$1,575-$3,100
	Network PC 386	80386	1.975	Optional	1	40	MS-DOS, Xenix, OS/2	Token-Ring, Banyan Vines, NGEN Cluster, Arcnet	EGA/CGA/Hercules	$3,267-$4,925
Daisy Systems Corp. (408) 960-0123	Advansys series CAE/CAD[5] Workstations	80386	5	Yes	8-16	141-16G	SunOS (Unix), DOS	Ethernet	1,152 x 900 color monochrome	$24,00-$89,000
Data General Corp. (508) 366-8911	MV/1400 DC	Eclipse	1	Yes	4-12	40-1,440	AOS/VS, DG/UX, DG/RDOS, AOS/RT32	Ethernet, DG/Starlan	NP	$9,995-$18,300
	MV/2000 DC	Eclipse	1	Yes	4-12	40-1,608	AOS/VS, DG/UX, DG/RDOS, AOS/RT32	Ethernet, DG/Starlan	NP	$19,150-$26,600
Datamedia Corp. (603) 886-1570	Colorscan/2	NEC V30	NA	Optional	768K	2-20	MS-DOS	PDSA, PC-NFS, Netware, 3+, OSI[6]	640 x 480 x 16, 800 x 480 x 4	$2,000-$5,000
Digital Equipment Corp. (508) 493-8717	Vaxstation 2000	ZMOS 78032	1***	ZMOS 78132 Floating-Point unit	4-14	42-318	VMS, Ultrix-32	Decnet, TCP/IP, Ethernet	1,024 x 864 color, monochrome	$5,230-$14,533
	Vaxstation II/GPX	ZMOS 78032	1***	ZMOS 78132 FPU	5-16	71-477	VMS, Ultrix-32	Decnet, TCP/IP, Ethernet	1,024 x 864 color, monochrome	$22,650-$37,150
	Vaxstation 3200	CMOS 78034	3.6-4.2 ***	CMOS 78134 FPU	8-16	71-318	VMS, Ultrix-32	Decnet, TCP/IP, Ethernet	1,024 x 864 color, monochrome	$21,100-$36,150
	Vaxstation 3500	CMOS 78034	3.6-4.2 ***	CMOS 78134 FPU	16-32	280-560	VMS, Ultrix-32	Decnet, TCP/IP, Ethernet	1,024 x 864 color, monochrome	$52,800-$60,800
	Vaxstation 8000	VAX 8250	Internal CPU 1.6***, I/O CPU 3***	Yes	16-32	159-477	VMS	Decnet via Ethernet	1,024 x 864 color	$90,110
Dynatech Computer Systems (415) 964-7400	DMI-700	68030	7, 21	Yes	8-64	15G	Unix V.3	TCP/IP	1,280 x 1,024	$10,000-$90,000
Edge Computer Corp. (602) 951-2020	Edge 1000 series	Proprietary	6, 11	Yes	32-64	20G	Unix, Pick	Ethernet, TCP/IP, Sun NFS[7], IBM SNA[8]	NA	NP
	Edge 2000 series	Proprietary	16, 55	Yes	32-1G	20G	Unix, Pick	Ethernet, TCP/IP, Sun NFS, IBM SNA	NA	NP
Fujitsu Microsystems of America, Inc. (408) 434-1160	Series 2000 System 2100/50	80386	NA	NA	1	67	Pick	Common Network Architecture	NA	$12,000-$18,000
	Series 2000 System 2200/50	80386	NA	NA	2-8	139-417	Pick	Common Network Architecture	NA	$19,750-$47,450
	Series 2000 System 2400/60	68020	16.67	NA	2-8	139-834	Pick	Common Network Architecture	NA	$29,500-$100,500
	Series 2000 System 2400/60XP	68020	NA	NA	2-8	139-834	Pick	Common Network Architecture	NA	$35,000-$115,000
	Series 2000 System 2500/80	68030	NA	NA	2-10	139-834	Pick	Common Network Architecture	NA	$89,500-$178,500
	Series 2000 System 2600/80	68030	NA	NA	4-16	333-1,998	Pick	Common Network Architecture	NA	$149,000-$341,000
Hewlett-Packard Co. (303) 229-2370	HP 9000 Model 319C+ 2-D color workstation	68020, 16.7 MHz	2	68881	4-16	41-4.5G	HP-UX (Unix), Basic	ARPA/Berkeley, IBM SNA, RJE, Decnet, NFS	1,024 x 768 color	$9,785-$41,405
	HP 9000 Model 360 SRX 3-D color workstation	68030, 25 MHz	4.5	68882	4-16	41-8G	HP-UX (Unix)	ARPA/Berkeley, IBM SNA, RJE, Decnet, NFS	1,024 x 768 (12 in.) 1,024 x 768 (16+19 in.) 1,280 x 1,024 (16+19 in.) color;512 x 400 (12 in.) 1,024 x 768 (17 in.) 1,280 x 1,024 (19 in.) monochrome	$34,965-$69,905
	HP 9000 Model 835 Turbo SRX 3-D color workstation	HP Precision Architecture, 15 MHz	14	2.02M-byte floppies	8-96	41-6.85G	HP-UX (Unix)	ARPA/Berkeley, IBM SNA, Decnet, NFS	1,280 x 1,024 color	$72,250-$127,550

* Based on *Computerworld* estimates.
***One DEC MIPS equals the performance of the VAX 11/780.
[1]Reduced instruction set computing [2]Million instructions per second [3]Transmission Control Protocol/Internet Protocol [4]IBM's Enhanced Graphics Adapter/Color Graphics Adapter [5]Computer-aided design and manufacturing [6]Open Systems Interconnect [7]Network File Server [8]Systems Network Architecture [9]Manufacturing Automation Protocol [10]Very large-scale integration [11]Technical and Office Protocol [12]Sun's Scalable Processor Architecture

The companies included in this chart responded to a recent telephone survey conducted by *Computerworld*. When a vendor is unable to provide specific information about its product, the abbreviation NP (not provided) is used. When a question does not apply to a vendor's product, the abbreviation NA (not applicable) is used. Further product information is available from the vendors.

COMPANY	PRODUCT	CPU (MICROPROCESSOR)	PERFORMANCE IN MIPS	DEDICATED FLOATING-POINT PROCESSOR	MAIN MEMORY RANGE (MEGABYTES)	STORAGE RANGE (MEGABYTES)	OPERATING SYSTEMS	TYPES OF NETWORKS SUPPORTED	GRAPHICS RESOLUTION	SYSTEM PRICE
IBM Contact local sales office	6151-115	IBM CMOS RISC	4.5	Yes	4-16	70-6,644	AIX/RT	Ethernet, Token-Ring	19-in. color, monochrome	$10,000-$100,000
	RT 6150 Model 135	IBM-enhanced CMOS RISC processor	5.6	Yes	16	114-7,460	AIX/RT	Ethernet, Token-Ring	19-in. color, monochrome	$30,595- $100,000+
Integrated Solutions, Inc. (408) 943-1902	Optimum series	68030, 68020	7	68881, 68882	4-32	139-4,94	Unix 4.3 BSD/System V.3	TCP/IP, NFS, RFS, Ethernet	1,280 x 1,024 color, monochrome	$9,900-$40,400
Intergraph Corp. (205) 772-2000	Interpro 120	Intergraph Clipper C100	4	Yes	6	1.56-4.56G	Unix System V	Ethernet, XNS, TCP/IP, Decnet, ISO/OS	1,184 x 884 color	$16,000-$19,000
	Interpro 220	Intergraph Clipper C100	5	Yes	8-16	1.56-4.58G	Unix System V	Ethernet, XNS, TCP/IP, Decnet, ISO/OS	1,184 x 884 color	$26,000-$30,000
	Interpro 340	Intergraph Clipper C100	5	Yes	16-80	1.56-11.4G	Unix System V	Ethernet, XNS, TCP/IP, Decnet, ISO/OS	1,184 x 884 color	$40,000
	Interpro 360	Intergraph Clipper C100	5	Yes	16-80	1.56-11.4G	Unix System V	Ethernet, XNS, TCP/IP, Decnet, ISO/OS	1,184 x 884 color	$52,000
Motorola, Inc.: Microcomputer Division (602) 438-3500	VME Delta Series Model 1147 Computer System	68030	4.72	68882	4-16	85-600	Unix	Ethernet, TCP/IP, Micro Top, Office LAN, 3274 SNA and BSC, 3776 SNA, RJE/Hasp, MAP[9]	NP	$12,495-$19,225
	VME Delta Series Model 3300 Workgroup Computer System	68030	3.77	68882	4-16	48-300	Unix	Ethernet, TCP/IP, Micro Top, Office LAN, 3274 SNA and BSC, 3776 SNA, RJE/Hasp, MAP	NP	$9,995-$18,725
	VME Delta Series Model 3600 Workgroup Computer System	68030	4.72	68882	4-16	85-1.2G	Unix	Ethernet, TCP/IP, Micro Top, Office LAN, 3274 SNA and BSC, 3776 SNA, RJE/Hasp, MAP	NP	$16,995-$23,725
	VME Delta Series Model 3640 Departmental Computer System	68030	5.25	68882	8-32	85-1.56G	Unix	Ethernet, TCP/IP, Micro Top, Office LAN, 3274 SNA and BSC, 3776 SNA, RJE/Hasp, MAP	NP	$27,425-$32,425
	VME Delta Series Model 3840 Departmental Computer System	68030	NP	68882	8-40	150-1.56G	Unix	Ethernet, TCP/IP, Micro Top, Office LAN, 3274 SNA and BSC, 3776 SNA, RJE/Hasp, MAP	NP	$38,425-$41,425
NCR Corp. (800) 544-3333	NCR 3390 workstation	80286-10	1.45	Yes	512K-2.6	20	NCR-DOS, NCR MS OS/2, Xenix	NCR Token Ring, Novell Netware	640 x 350, 720 x 348 monochrome; 640 x 200, 640 x 350 color	$1.495-$2,580
	NCR 3392 workstation	80286-10	1.45	Yes	640K-4	40	NCR-DOS, NCR MS OS/2, Xenix	NCR Token Ring, Novell Netware	640 x 350, 720 x 348 monochrome; 640 x 200, 640 x 350 color	$2,174-$3,135
Prime Computer, Inc./merged with Computervision (617) 655-8000	Caddstation Model 30M	68020	1.5	68881	4	NA	SunOS (Unix)	TCP/IP	1152 x 900 monochrome	$5,395-$5,395
	Caddstation Model 32C	68020	2	68881	4-16	156-320	BSD 4.2	Ethernet	1152 x 900 x 8 color	$29,900-$69,700
	Caddstation Model 32M	68020	2	68881	4-16	156-320	BSD 4.2	TCP/IP, Ethernet	1152 x 900 monochrome	$21,900-$61,700
	Caddstation Model 32S	68020	2	68881	4-16	NP	SunOS (Unix)	TCP/IP	NP	$19,950-$147,500
	Caddstation Model 33C	68020	3	68881	4-24	510	BSD 4.2	TCP/IP, Ethernet	1,152 x 900 x 8 color	$13,900-$43,700
	Caddstation Model 33F	68020	3	68881	4-24	510	BSD 4.2	TCP/IP, Ethernet	1,152 x 900 x 8 color	$10,900-$40,700
	Caddstation Model 33M	68020	3	68881	4-24	510	BSD 4.2	TCP/IP, Ethernet	1,152 x 900 monochrome	$8,900-$38,700
	Caddstation Model 34C	68020	4	68881	8-32	141-4 x 141	SunOS (Unix)	TCP/IP	1,152 x 900 x 8 color	$36,900-$80,900
	Caddserver 34S	68020	4	68881	8-32	515-8 x 515	SunOS (Unix)	TCP/IP	1,152 x 900 x 8 color	$25,900-$153,500
	PXCL 5500 Engineering Workstation	Custom VLSI[10] RISC	7, 10	Custom Floating-Point processor	4-16	170-760	Unix	TCP/IP, NFS	1,280 x 1,024 color	$52,900-$79,900
Raster Technologies, Inc., an Alliant Co. (508) 486-4950	Sun/GX workstation	Sun-3/200, Sun-4/200 series	4, 10	Yes	8-128	170-2.2G	SunOS (Unix)	Ethernet, MAP, TOP[11]	1,280 x 1,024 color	$72,000-$150,000
Silicon Graphics, Inc. (415) 960-1980	Iris 4-D series	MIPS R2000 (8 MHZ, 12.5 MHz, 16.7 MHz)	MIPS[11] R2000 (8 MHz = 7 MIPS, 12.5 MHz = 10 MIPS, 16.7 MHz = 13 MIPS)	Yes — from MIPS	8-128	9.6G	Unix V.3	Decnet, IBM 3270, Hyperchannel, Ethernet, IBM 5080	1,280 x 1,024 color	$49,900-$89,900
Sun Microsystems, Inc. (415) 960-1300	Sun-3/50	68020, 15 MHz	1.5	68881	4	71-1.3	SunOS (Unix)	Ethernet, NFS, TCP/IP	1,152 x 900	$4,995-$15,795
	Sun-3/60	68020, 20 MHz	3	68881	4-24	71-1.3G	SunOS (Unix)	Ethernet, NFS, TCP/IP	1,152 x 900	$8,990-$23,300
	Sun 386I/150	80386, 20 MHz	3+, 4+ with cache option	80387	4-16	91-981	SunOS (Unix)	Ethernet, NFS, TCP/IP	1,152 x 900	$7,990-$28,490
	Sun 386I/250	80386, 25 MHz	5+	80387	4-16	91-981	SunOS (Unix)	Ethernet, NFS, TCP/IP	1,152 x 900	$11,990-$29,990
	Sun-3/160	68020, 16.67 MHz	2	68881	4-16	280-1.8G	SunOS (Unix)	Ethernet, NFS, TCP/IP	1,152 x 900	$21,900-$71,500
	Sun-3/260	68020, 25 MHz	4	68881	4-32	280-1.8G	SunOS (Unix)	Ethernet, NFS, TCP/IP	1,152 x 900	$28,900-$76,000
	Sun-4/110	SPARC[12], 14.28 MHz	7	Weitek 1164/1165	8-32	141-1.3G	SunOS (Unix)	Ethernet, NFS, TCP/IP	1,152 x 900	$18,900-$35,800
	Sun-4/150 CXP	SPARC, 14.28 MHz	7	Weitek 1164/1165	8-32	141-1.3G	SunOS (Unix)	Ethernet, NFS, TCP/IP	1,152 x 900	$44,900-$54,300
	Sun-4/260	SPARC, 16.67 MHz	10	Weitek 1164/1165	8-128	280-3.6G	SunOS (Unix)	Ethernet, NFS, TCP/IP	1,152 x 900	$39,900-$111,500
Tektronix, Inc. (503) 235-7202	4319 2-D color graphics workstation	68020, 20 MHz	2	68881, 20 MHz	4-12	86-300	Unix	Ethernet with TCP/IP protocol	1,280 x 1,024 color	$11,950-$27,750
	4324 2-D color graphics workstation	68020, 16 MHz	2	No	4-12	1.2-86	Unix	Ethernet, TCP/IP, Sun NFS	1,024 x 768 color	$26,950-$50,250
	4325 2-D color graphics workstation	68020, 16 MHz	2	No	4-12	1.2-86	Unix	Ethernet, TCP/IP, Sun NFS	1,024 x 768 color	$29,950-$53,250
	4335 color graphics workstation	68020/ 68881, 20 MHz	2.5	No	4-12	1.2-86	Unix	Ethernet, TCP/IP, Sun NFS, X-Windows	1,280 x 1,024	$37,500-$94,306
	4336 color graphics workstation	68020/ 68881, 20 MHz	2.5	No	4-12	1.2-86	Unix	Ethernet, TCP/IP, Sun NFS, X-Windows	1,280 x 1,024	$47,500-$108,300
	4337 color graphics workstation	68020/ 68881, 20 MHz	2.5	No	4-12	1.2-86	Unix	Ethernet, TCP/IP, Sun NFS, X-Windows	1,280 x 1,024	$51,500-$110,800
Unisys Corp. (303) 449-1138	Model 1450 CAD/CAM workstation	68020	3	Single, double precision	4-10	142	Unix System V.3	Ethernet, TCP/IP	1,024 x 768	$32,600

VGA

Princeton's Very Good Answers.

Without question, Princeton's PSC-28 and PSM-03 monitors will bring you the ultimate in VGA performance. Princeton was the first to offer truly compatible VGA dedicated monitors. Our PSC-28 is a 770 × 570, .28mm dot pitch, high resolution analog color monitor that can display an infinite number of colors. The PSC-28 also features a convenient color button for green, amber or cyan text. The PSM-03, a high resolution analog monochrome monitor gives you outstanding 800 × 630 resolution, and the ability to display infinite shades of gray. Plus sharp crisp graphics and character definition from its dynamic focusing circuitry.

Both monitors are compatible with IBM PC*, XT*, AT*, PS/2, Apple Macintosh SE* and compatible personal computers. Each gives you full compatibility with the leading VGA adapter cards including the QuadVGA and VEGA VGA. So if VGA meets all your needs (and you don't require the additional flexibility of our famous ULTRASYNC and MAX-15 autosynchronous monitors), investigate the cost/performance value of the PSC-28 and PSM-03.

Unsurpassed quality, service and performance make it hard to beat Princeton monitors. We offer better value than our competition. We call it the Visible Edge. For answers to all your questions about VGA compatible monitors, contact us at 601 Ewing Street, Building A, Princeton, New Jersey 08540 (609) 683-1660, x 8126.

**Requires proper adapter card*

PRINCETON®
GRAPHIC SYSTEMS
AN INTELLIGENT SYSTEMS COMPANY

THE VISIBLE EDGE

Conformity takes hold as small systems pass peak

BY J. A. SAVAGE

The small systems market has matured. The market's growth rate is averaging less than 10%, according to figures supplied by Dataquest, Inc. As a result, the systems are looking more like the classic textbook example of what happens in a mature market: Whether the products are computers, breakfast cereals or cars, they become standardized.

Buyers have been offered two major choices this year, and the path users choose seems to have more to do with their tolerance for adventure than with any concrete advantages of either choice. The one trend both choices have in common is that they offer some degree of standardization.

More daring users can go with standard architectures and operating systems offered by a gaggle of smaller vendors. Open standard architecture, like that based on Intel Corp.'s 80386 processors

SMALL SYSTEMS

running the Unix operating system, offers the comfort of a larger pool of young technicians and an open-air bazaar of applications from which to choose.

The less adventurous can wrap themselves in the warm blanket of proprietary "standards" backed by the big hardware vendors, while maintaining the option of some software standardization.

Choices such as the entry-level IBM AS/400s offer a secure growth path but afford users a smaller pool of technical soldiers to support them.

The big players, like IBM, Digital Equipment Corp. and Hewlett-Packard Co., pursue their proprietary architecture kingdoms with standards like IBM's Systems Applications Architecture (SAA) and HP's Spectrum reduced instruction set computing-based architecture, or RISC.

Many of the smaller vendors' systems introduced this year are designed around Intel's 80386, giving the appearance of 386 standardization. Vendors have not flocked to Motorola, Inc.'s standard processor, the 68030, introduced earlier this year, although analysts say this processor is equal to, if not better than, Intel's. The 386 processor has a comfortable reputation as a commercial architecture, and the system is bought for its reputation, not for its functionality, says Jeanette Sill-Holeman, an analyst at Santa Clara, Calif.-based Infocorp.

Integration duty

Besides the rush to standardization, another curious trend appeared in the past year. Following the proliferation of office PCs, users have forced a change in the role of small systems. The box that used to be plopped in the back room hosting dumb terminals is now more often posted for duty as a file server to integrate personal computers and workstations.

The most significant introduction of standardized hardware, and certainly the one most speculated on, was IBM's AS/400, offering SAA, which is supposed to bridge migration from the low end to the high end so that applications can grow without changing architectures.

But while IBM calls it a standardization of hardware, the AS/400 is still a proprietary hardware standard, offering to run a few open standards interfaces like SQL. In other words, the standardization is only good for those users who are already in the IBM world.

The AS/400, too, may be used as both file server and minicomputer through its built-in token-ring local-area network adapter. It has four models at the low end, accommodating from four to 48 users.

Most of the early customers for the low-end AS/400 models have been users migrating either to expand capacity or to consolidate the work of several System/36s. But analysts and consultants, such as Cynthia Boucher, technical manager at San Francisco-based Computer Resources Group, Inc., predict that the growth potential within the line will attract many first-time users.

Boucher, however, is not sure that this is really the best of all possible moves for first-timers. IBM, she warns, is moving the onus of technical expertise into the customer's court. Besides, she explains, although she has worked closely with the new system, she has yet to see that the AS/400 offers any more functionality than the System/36 or 38.

While the AS/400 is still too new to get an idea of how briskly it is selling, analysts predict the system will take over what little market remains for IBM's 9370.

"In our cost-of-ownership study, the 9370 was simply the most expensive system for equivalent functionality, and it's getting pricier by the day," says Marty Gruhn, an analyst at Phoenix-based

Savage is a *Computerworld* West Coast correspondent.

Unretouched Screen Images

Buy The One On The Left And You'll Have To Put It Where The Sun Don't Shine.

The monitor on the right, however, can be placed anywhere you like. Even in direct sunlight. It's the new *Flat Technology Monitor* from Zenith Data Systems—winner of *PC Magazine's* coveted "Technical Excellence Award" in the hardware category for 1987.

You Have To See Zenith To Believe It

So clear. So precise. So lifelike. It's the only monitor with a completely flat screen. A breakthrough that has redefined monitor quality forever. Industry experts are already convinced. And once you see it in person, you'll be a believer, too.

Bigger, Brighter, Glare-Free

Our Flat Technology Monitor has an impressive 14-inch display. And even though it's bigger, it's 50% brighter than conventional CRT's and it has 70% greater contrast. So you get colors with greater depth and definition that make your reports, charts and graphs come alive like never before.

The Flat Technology Monitor is virtually glare-free. So you can work longer without the usual headaches and eyestrain. And that means greater productivity. But to get the whole picture, you have to see it with your own eyes.

Backward And Forward Compatibility

You also get full compatibility with the high resolution VGA Video generated by IBM's new PS/2® computers. And with Zenith's Z-449 or other VGA-class video cards, you can enjoy CGA, MDA, Hercules and EGA graphics as well.

Experience Zenith's Latest Technology Breakthrough

Obviously, a mere picture can't do justice to our new Flat Technology Monitor. It demands a face-to-face evaluation. For a hands-on demonstration, call today for the name of your nearest authorized Zenith Data Systems dealer—the Flat Technology Monitor is available in quantities right now.

1-800-553-0305

THE QUALITY GOES IN BEFORE THE NAME GOES ON®

© 1988, Zenith Data Systems

Personal System/2 and PS/2 are registered trademarks of IBM Corp.

Conformity

FROM PAGE 85

The Sierra Group, Inc.

Digital Equipment Corp.'s Microvax II continues to be the strongest DEC product offering at the low end. "It's the workhorse of the family," says Bob Randolph, director of program services at Westford, Mass.-based Technical Financial Services, Inc.

The Microvax 3500 and 3600 have cache memory, while comparable AS/400 models, the B40 and B50, do not.

Conversely, DEC's lower end Microvax II and Microvax 2000 can handle less than half the disk storage of comparable AS/400s — the Models B10, B20 and B30.

DEC products are the antithesis of HP's RISC architecture, embodied in the Spectrum series introduced in April, according to a report from New York-based Sanford C. Bernstein & Co. The two different architectures require radically different methods of applications.

"While HP has to add things to tailor its machines to particular markets, DEC subtracts them," the report says. "The Microvax II implements about half the instructions in the processor but makes the others available in software."

The one HP RISC-based machine that is currently available at the low end — the 925 — appears to be selling well and may even be attracting new commercial HP customers, analysts say. For HP's loyal base, the machine provides relief for those users who need to migrate to larger systems, Infocorp analyst Sandra Gant says.

HP also introduced non-RISC machines at the low end and cut prices nearly in half for those who want to buy into HP's traditional architecture.

While RISC architecture is HP's foray into standardization, it still uses a proprietary operating system.

RISC architecture has been played up in the press, particularly with introductions of two Unix-based systems by Sunnyvale, Calif.-based Mips Computer Systems, Inc.

> USERS OF small systems apparently care little about what operating system or architecture is offered, just so long as their applications run well.

But Infocorp's Sill-Holeman and other analysts say that for the next couple of years the architecture will not be much of a factor in users' buying decisions, with the possible exception of Mips at the low end.

The two new Mips systems are a 12 million instruction per second (MIPS) system introduced in May and a 20 MIPS system introduced in July at $2,500 and $5,900 per MIPS, respectively. The system at the low end can handle between 10 and 75 users, the one at the high end between 25 and 150, depending on the application.

Texas Instruments, Inc. does not appear to be pursuing any of the paths of other vendors. It has not announced adherence to standards, nor have its new models incorporated daring technologies like RISC.

In the past year, TI introduced five new models in its 17-year-old Business Systems series, based on a proprietary processor, and reduced prices on its older models.

Whatever works

While most small systems vendors bet on Unix-based systems this year, two decided to take a different tack. Prime Computer, Inc. incorporated three operating systems — Unix, Pick and MS-DOS — in its EXL 316. And Data Voice Solution Corp. took a stand in the MS-DOS world with its Centaur II mini.

Small systems vendors may feel software standards are necessary in order to be part of the game.

But users of these systems apparently care little about what operating system or architecture is offered, as long as

Continued on page 92

SCIENCE/SCOPE®

Tiny infrared detector arrays are one hundred times more sensitive than current detectors, and enable astronomers to observe very faint infrared-radiating sources, even using relatively small telescopes. The Hughes Aircraft Company-built arrays, sensing infrared radiation, can penetrate the thick gas and dust that obscure our galaxy's star-forming regions. The arrays are expected to provide a clearer picture of the center of the galaxy, which many astronomers believe is hiding an enormous black hole obscured by gas and dust. The new detector arrays should also help in the search for elusive, failed stars called brown dwarfs. Brown dwarfs lack the mass to start hydrogen burning in their cores and are invisible to optical astronomy.

A new Probeye® thermal video system achieves true portability by using thermoelectric cooling, which eliminates the need for gas or liquid nitrogen supplies. Using rechargeable batteries, the Probeye Model 7100, built by Hughes, is a complete thermography system that provides a visual display of the temperature distribution of a scene being viewed by the infrared imager. The Model 7100 features enhanced capabilities to provide more information and a wider range of applications than previous thermal video systems, and provides a display resolution of 240 infrared scan lines—four times greater than previous Probeye viewers.

A network of "smart" digital battlefield radios provides accurate battlefield positions to U.S. Marines and their commanders, letting them know at all times where they and friendly forces are located. The Position Location Reporting System (PLRS), developed by Hughes for the U.S. Army and Marine Corps, consists of master stations, and specialized radios that can be hand carried by a Marine in the field, mounted in vehicles or aboard aircraft. PLRS weighs approximately 23 pounds, and includes a battery, antenna, and readout device. Master stations include a radio and computer suite, are self-contained except for prime power, and designed for rapid deployment by ground vehicles or aircraft.

A new satellite is providing domestic communications to most of the South Pacific and added coverage to Australia. Aussat 3, designed and built by Hughes, is the last in a fleet of three communications satellites for AUSSAT Pty., Ltd., Australia's national satellite company. The satellite will augment voice, video, and data services currently provided by the first two satellites in Australia, its offshore islands, and New Guinea. Aussat 3 has a three-reflector antenna to produce seven transmit beams for regional and national coverage. Additionally, two horn antennas provide coverage to New Zealand and South Pacific islands. The Aussat satellites tie together the nation's 101 air traffic control stations, provide business communication networks, and are used in medical emergencies through aids such as slow-scan television for diagnostic purposes.

Support Systems in Southern California designs, develops, and manufactures some of the most sophisticated training simulators and a wide array of automatic and manual test systems. In addition, field engineering and technical support of a wide range of electronic systems keep Hughes' systems operating at top efficiency worldwide. Opportunities are available for a variety of engineers qualified by degree or work experience. They include systems, radar, MATE control and support software engineers, logic designers and image processors. Please send your resume to Lowell Anderson, Professional Employment, Dept. S3, Hughes Aircraft Company, P.O. Box 9399, Long Beach, CA 90801-0463. Equal opportunity employer. U.S. citizenship required.

For more information write to: P.O. Box 45068, Los Angeles, CA 90045-0068

HUGHES

Subsidiary of GM Hughes Electronics

© 1988 Hughes Aircraft Company

Small systems

COMPANY	PRODUCT	DATE FIRST INSTALLED	PRIMARY MARKET[1]	MOST COMPARABLE DEC OR IBM SYSTEM	PERFORMANCE (MIPS)*	MACHINE CYCLE TIME (NSEC)	MEMORY RANGE (MEGABYTES)	DISK TRANSFER RATE (MEGABIT/SEC.)	DISK CAPACITY (MEGABYTES)	NUMBER OF PORTS	OPERATING SYSTEMS	MAXIMUM NUMBER OF USERS	TYPICAL NUMBER OF USERS	WORD LENGTH (BITS)	BASE PRICE
Acer Counterpoint (408) 434-0190	System 19K	NP	DP, OA	NP	2-16	360	3-40	10	2.5G	6-96	CXIX	64	20	32	$35,000 with two CPUs, 8M bytes memory, 26 ports, Ethernet, 230M-byte disk, 60M-byte tape
	System 22	NP	DP, OA	NP	4-32	140	4-128	NP	11.2G	7-256	CXIX	128	40	32	$70,000 with four CPUs, 16M bytes memory, 47 ports, Ethernet, 720M-byte disk, 150M-byte tape, operating system
Alpha Microsystems, Inc. (714) 957-8500	AM-1200M	January 1987	DP	Microvax II	0.6	100	1-4	5	580	13	AMOS[2]	13	NP	16	$5,175 with 68010 CPU, five ports, 20M-byte disk, 1M-byte memory, VCR backup
	AM-2000M	April 1988	DP	Microvax II	3+	62	4-16	23 msec	580	2-32	AMOS	32	NP	32	$10,760 with 68020 CPU, two ports, 70M-byte disk, 4M bytes memory, VCR backup
	AM-2000-06	April 1986	DP	VAX 8200	3	62	2-60	23 msec	580	6-32	AMOS	30	NP	32	$18,550 with 68020 CPU, six ports, 70M-byte disk, 2M-byte memory, VCR backup
	AM-2000-10	April 1986	DP	VAX 8200	3+	62	4-108	18-23 msec	3.4G	240	AMOS	240	NP	32	$25,550 with 68020 CPU, six ports, 70M-byte disk, 2M bytes memory, VCR backup
	AM-2000-21	September 1987	DP	VAX 8200	3+	62	4-120	18-30 msec	3.4G	6-240	AMOS	240	NP	32	$31,800 with 68020 CPU, six ports, 70M-byte disk, 2M bytes memory, VCR backup
	AM-3000	December 1987	DP	VAX 8200	6+	50	8-120	18-23 msec	2.4G	360	AMOS	360	NP	32	$27,850 with 68020 CPU, six ports, 70M-byte disk, 2M bytes memory, VCR backup
Altos Computer Systems (800) ALTOS-US	386 Series 500	September 1988	OA	PS/2 Model 80	3	100	Up to 16	5	140	3	Altos System V, MS-DOS	8	1-8	32	NP
	386 Series 2000 Model 20	June 1988	DP, OA	Microvax II	4-5	20	4-16	1.2	NP	20-64	Altos System V	64	40-50	32	NP
	Altos 386 Series 1000	December 1987	NP	PS/2, System/36	3.5	120	4-16	4	380	24	Altos System V	24	12	32	NP
Applied Digital Data Systems, Inc. (516) 231-5400	Mentor 6000 Model 8	1986	DP, OA, TP	AS/400	3	NP	4-16	NP	140M-4G	16-254	Pick	250	48-96	32	$123,000 with 140M-byte disk, 4M bytes memory, ¼-in. tape, console, 16 ports, external disk subsystem
	Mentor 6000 Model 2	1986	OA, TP	AS/400	2	NP	2-8	NP	140M-3G	8-128	Pick	124	16-32	32	$21,500 with 2M bytes memory, 140M-byte disk, ¼-in. tape, console, eight ports
	Mentor 6000 Model 6	1986	—	AS/400	3	NP	2-16	NP	140M-4G	16-128	Pick	124	32-64	32	$73,000 with 2M bytes memory, 140M-byte disk, ¼-in. tape, 10 ports, console, external disk subsystem, tape drive
	Mentor 6000 Model 4	1986	DP, OA, TP	AS/400	3	NP	2-16	NP	140M-4G	8-96	Pick	92	16-48	32	$29,000 with 2M bytes memory, 140M-byte disk, ¼-in. tape, eight ports, console
	Mentor 1800	Will be available October 1988	DP, OA, TP	PS/2 series	NP	16 MHz	640K-2M	NP	Up to 140M	Up to 11	Mentor O/S	11	NP	32	NP
	Mentor 1700A	February 1986	DP, OA, TP	PC AT	NP	10 MHz	512K-640K	NP	40-140	Up to 11	Mentor O/S	11	NP	16	$9,625 with 512K bytes memory, 1.2M-byte floppy disk, 40M-byte hard disk, ¼-in. cartridge tape backup, one parallel port, eight serial ports
	Mentor 1600	October 1987	DP, OA, TP	PC AT	NP	10 MHz	512K-640K	NP	20	3	Mentor O/S	3	NP	16	$2,850 with 512K bytes memory, high-resolution monitor, 720K-byte floppy disk, one parallel port, two serial ports
AT&T (201) 221-2000	3B15	December 1985	DP, OA	IBM 9370 Model 60, AS/400 Model B50; VAX 8250, 8350	NP	NP	2-16	1.2-18.8	NP	128	Unix System V	128	80	32	$44,000 with CPU, math accelerator unit, 16K bytes cache, two ports, 2M bytes memory, integrated disk, file controller, cabinet, Unix System V, main memory controller
	3B2/310	1984	DP, OA, SE	System/36, RT, PS/2; Microvax II, Microvax 2000	1.5	100	30-72	5	72M-14.4G	38	Unix System V	34	6-14	32	$8,700 with 1M byte memory, 30M-byte hard drive, I/O port card
	3B2/700	May 1988	DP, OA, SE, TP	AS/400; Microvax III	5-9	45	8-64	1.5-4	NP	90	Unix System V	90	64-80	32	$69,000 with 4M bytes memory, two 300M-byte hard disks, 720K floppy disk
	3B2/600	March 1987	DP, OA, SE, TP	IBM 9373, AS/400; Microvax II, III, 3500, 3600	4-6	56	4-16	1.5	NP	90	Unix System V	90	40-64	32	$46,500 with 4M bytes memory, two 142M-byte hard disks, 720K-byte floppy
	3B2/500	September 1987	DP, OA, SE, TP	IBM 9373-20, AS/400; Microvax II	5-6	56	4-8	1.5-4	NP	50	Unix System V	50	25-40	32	$24,000 with 4M bytes memory, 147M-byte hard disk, 720K-byte floppy, 60M-byte cartridge tape
	3B2/400	NP	DP, OA, SE, TP	System/36 Model 5360; Microvax 2000	1.5	100	1-4	1.5	NP	90	Unix System V	90	14-25	32	$13,400 with 1M byte memory, 30M-byte hard disk, 720K-byte floppy
	6386 Work Group System	NP	DP, OA, SE	PS/2 Model 80	4-5	100	2-64	NP	300	2	Unix, MS-DOS	64	33	NP	NP
Charles River Data Systems, Inc. (508) 626-1000	Universe/200	January 1985	DP, OA, SE, TP	NP	5.5	200	1-64	1.5	3.2G	32	UNOS, Unix	32	2-8	NP	$10,395 with 1M byte memory, four RS-232 ports, 51M-byte disk, 1.2M-byte floppy disk controller, six-slot chassis
	Universe/400	January 1985	DP, OA, SE, TP	NP	5.5	200	1-112	1.5	3.2G	64	UNOS/Unix	64	6-32	NP	$14,300 with 1M byte memory, four RS-232 ports, 51M-byte disk, 1.2M-byte floppy, six-slot VME chassis
	Universe/600	January 1985	DP, OA, SE, TP	NP	5.5	200	1-112	1.5	3.2G	250+	UNOS/Unix	250+	16-96	NP	$27,800 with 1M byte memory, four RS-232 ports, 51M-byte disk, 1.2M-byte floppy disk controller, 20-slot VME chassis
CIE Systems, Inc., a unit of C. Itoh (714) 660-1800	680/45	July 1987	DP	NA	2	10-23	1-8	5	53-170	8	Pick	15	8	16	$9,995 with 1M byte memory, 53M-byte hard disk, 500K-byte floppy, eight ports, desktop enclosure, diagnostics, utilities, documentation, four-slot chassis

*Based on *Computerworld* estimates
***One DEC MIPS equals the performance of the VAX 11/780
[1]Commercial data processing (DP); scientific/engineering (SE); office automation (OA); on-line transaction processing (TP)
[2]Alpha Micro Operating System
[3]Resource Management System/Extended Architecture
[4]Uninterruptible power supply
[5]Transmission Control Protocol/Internet Protocol
[6]IBM System Support Program

The companies included in this chart responded to a recent telephone survey conducted by *Computerworld*. When a vendor is unable to provide specific information about its product, the abbreviation NP (not provided) is used. When a question does not apply to a vendor's product, the abbreviation NA (not applicable) is used. Further product information is available from the vendors.

COMPANY	PRODUCT	DATE FIRST INSTALLED	PRIMARY MARKET[1]	MOST COMPARABLE DEC OR IBM SYSTEM	PERFORMANCE (MIPS)	MACHINE CYCLE TIME (NSEC)	MEMORY RANGE (MEGABYTES)	DISK TRANSFER RATE (MEGABIT/SEC.)	DISK CAPACITY (MEGABYTES)	NUMBER OF PORTS	OPERATING SYSTEMS	MAXIMUM NUMBER OF USERS	TYPICAL NUMBER OF USERS	WORD LENGTH (BITS)	BASE PRICE
Computer Consoles, Inc. (714) 458-7282	Power 5/32X	September 1987	DP, OA	Microvax II	2	NP	4-16	NP	140-600	24-48	Unix System V	32	12-24	32	$26,000 with 4M bytes memory, 140M-byte disk, 60M-byte tape, 24 ports, operating system
	Power Server 386/1000	May 1988	DP, OA	PS/2 Model 80	2	NP	2-16	NP	90-180	8-24	Unix System V	16	4-16	32	$11,385 with 2M bytes memory, 90M-byte disk, 150M-byte tape, eight ports, Unix System V
Computer Designed Systems, Inc. (612) 545-2855	Adviser 2190, 2196, 2998-Z	June 1987	DP, TP	VAX 8000 series	NP	40	128-256	NP	NP	1,200	CVOS, Unix System V	1,200+	400	64	$59,000 with 32M bytes memory, one terminal, 80M-byte disk, four ports, power supplies
	Adviser 25 series	1985	DP, TP	Microvax; System/36, 38	6-14	NP	5-32	NP	40	50	NP	48	20-34	16-32	$11,500 with 1M byte memory, one terminal, 40M-byte disk, 60M-byte tape drive, four ports, power supplies
Convergent Technologies, Inc. (408) 434-2848	Ngen Series 286	September 1985	DP, OA	System/36	1.75***	250	1-4	8	2G	2-10	CTOS	12	6-8	16	$7,400 with 2M bytes RAM, two ports
	Ngen Series 386	January 1987	DP, OA	System/36	3.5***	125	1-4	8	2G	2-10	CTOS	20	12	32	$8,900 with 2M bytes RAM, two ports
	Ngen Series 386I	June 1988	DP, OA	System/38	4.5***	100	4-24	8	2G	2-10	CTOS	32	16-20	32	$12,900 with 4M bytes memory, two ports
	Server PC Model 100	June 1988	DP, OA	PC AT compatible	3.9***	187	2-12	3.3	NP	29	CTIX/386 (Unix V.3), MS-DOS	28	16	32	$9,499 with 2M bytes memory, 40M-byte disk, 150M-byte cartridge tape, four serial ports, one parallel port, UPS port, CTIX/386 license
	Server PC Model 200	Mid-1987	DP, OA	PC AT compatible	5.9***	150	4-64	3.3	NP	44	CTIX/386 (Unix V.3), MS-DOS	43	32	32	$19,499 with 4M bytes memory, 145M-byte disk, 150M-byte cartridge, three serial ports, one parallel port, UPS port, CTIX/386 license
Cubix Corp. (702) 883-7611	QB3 386	March 1988	OA, SE	IBM RT; Standard VAX	3	100	4-16	17	84M-2.2G	16-32	Unix System V.3	32	16	8	$13,995
	QB2 386	June 1988	OA, SE	IBM RT; Microvax	3	100	2-8	17	84-380	8	Unix System V.3	8	6	8	$8,995
Data General Corp. (508) 366-8911	MV/7800 XP	1987	DP, OA, SE, TP	Microvax II	1.6	220	2-14	2.67-5	NP	128	AOS/VS, AOS/RT32, DG/UX	90	20-65	32	$23,000 with 2M bytes memory, 16-slot chassis, power supply, I/O channels
	MV/7800 DCX	1987	DP, OA, SE	Microvax II	1.6	220	2-14	938K-1M	NP	48	AOS/VS, DG/UX	48	20-40	32	$33,300 with 2M bytes memory, 70M-byte disk, chassis, power supply
	MV/15000 Model 8	December 1986	DP, OA, SE, TP	Microvax III, VAX 6210	3	85	8-32	NP	NP	416	AOS/VS, DG/UX, AOS/RT32	150	40-80	32	$62,500 with 8M bytes memory, operating system, one channel
Datamedia Corp. (603) 886-1570	DMC/932 Model 2620	NP	OA	NP	3	120	2-16	10	170	6	Unix System V	32	10	32	$21,000 with 2M bytes memory, auxiliary storage processor, 170M bytes disk storage, 60M-byte cartridge tape drive, communications processor with two RS-422/RS-232C ports, four asynchronous ports, printer ports
Datapoint Corp. (512) 699-7000	7700	July 1988	DP, OA, TP	NP	4	62.5	4-16	1.5	79-142	2	RMS/XA	10-25	6-18	32	$14,995 with 8M bytes memory, 142M-byte disk, 150M-byte tape, Arcnet LAN interface
	7800	May 1988	DP, OA, TP	System/36; Microvax III	7	62.5	4-16	1.5	NP	60	RMS/XA	60	25	32	$29,995 with 8M bytes memory, 142M-byte disk, 150M-byte tape drive, dual symmetric CPUs, dual Arcnet LAN interface
Digital Equipment Corp. (Contact local DEC sales office)	VAX 8250	March 1987	DP, OA, SE, TP	NP	1.2***	160	16-128	2.8	29G	NP	VMS, Ultrix-32	NP	16-72	32	$94,800 with 16M bytes memory, operating system
	Microvax 3600	1987	DP, OA, SE, TP	System/38 Models 500-700, 9370 Model 90, AS/400 Model B60, B50	3***	NP	32-64	NP	2.4G	NP	VMS, Ultrix-32, VAX ELN	NP	60-120	32	$105,000 with 32M bytes memory, 622M-byte disk, 296M-byte tape drive, Ethernet, operating system
	Microvax 2000	1987	DP, OA, SE, TP	System/36, AS/400 Model B20	0.9***	NP	4-6	NP	318	NP	VMS, Ultrix-32	20	4-12	32	$8,200 with 4M bytes memory, 42M-byte disk, 1.2M-byte floppy, one-year warranty
	Microvax 3500	1987	DP, OA, SE, TP	System/38, 9370 Model 60-90, AS/400 Model B40, B50, B60	3***	NP	16-32	NP	1.2G	NP	VMS, Ultrix-32, VAX ELN	NP	50	32	$77,000 with 296M-byte tape, operating system, Ethernet, VMS server
	Microvax II	1985	DP, OA, SE, TP	System/36, 38, AS/400 Models 30 and 40, 9370 Model 40	0.9***	NP	8-16	NP	2.4G	NP	VMS, Ultrix-32	NP	20-40	32	$23,000
Dynatech Computer Systems (415) 964-7400	CS-700	NP	DP, SE	NP	5	80	4-16 (per processor)	10-15	4G	72+	Unix V.3	72+	16	32	$45,000
Fujitsu America, Inc. (408) 434-1160	System 2200/Model 50	June 1987	DP, OA, SE, TP	NP	NP	NP	2-4	139-417	NP	8-32	Pick	32	16-24	32	$19,750 with 2M bytes memory, 139M-byte disk, eight ports, 60M-byte tape, Pick
	System 2400 XP	July 1988	DP, OA, SE, TP	NP	NP	NP	2-8	139-834	NP	16-24	Pick	64	16-48	32	$29,500 with 2M bytes memory, 139M-byte disk, 16 ports, 60M-byte tape, tape drive, Pick
	System 2500/Model 80	NP	DP, OA, TP, SE	NP	NP	NP	4-10	139-834	NP	24-96	Pick	96	24-64	32	$89,500 with 4M bytes memory, 139M-byte disk, 24 ports, 60M-byte tape, tape drive
	System 2400/Model 60	September 1987	DP, OA, SE, TP	NP	NP	NP	2-8	139-834	NP	16-64	Pick	64	24-48	32	$29,500 with 2M bytes memory, 139M-byte hard disk, 16 ports, 60M-byte tape, UPS[4], Pick
	System 2100/Model 50	June 1988	DP, OA, SE, TP	NP	NP	NP	1	67	NP	2-18	Pick	18	2-10	32	$12,000 with 1M byte memory, 67M-byte disk, two ports, 60M-byte tape, Pick
General Automation, Inc. (714) 778-4800	Zebra 1350	First-quarter 1986	DP	AS/400	NP	80	512K-1M	5	30-67	6-12	Pick	12	6	16, 32	$8,300 with CPU, 512K bytes memory, 45M/60M-byte tape backup, six asynchronous ports, 30M-byte disk, one parallel port, Pick, spreadsheet, business graphics, word processing
	Zebra 1620	March 1988	DP, OA	AS/400	NP	80	1-2	5	80-134	8-16	Pick	16	8	32	$12,550 with CPU, 12.5 MHz, 1M byte memory, 45M/60M-byte tape backup, eight asynchronous ports, one parallel port, 40M-byte disk, Pick, spreadsheet, business graphics and word processing
	Zebra 1820	September 1987	DP	AS/400	NP	60	2-4	5	141-420	8-32	Pick	32	12	32	$16,600 with 16.7-MHz CPU, 1M byte memory, 47M-byte disk, 45M/60M-byte tape backup, eight asynchronous ports, one parallel port, Pick, spreadsheet, business graphics and word processing
Harris Corp. Computer Systems Division (800) 4-HARRIS	MCX-3 Model 40	March 1986	SE	Microvax II	4.1	60	2-8	650K-1.2M	86-340	4-12	Unix System V	32	2-12	32	$18,725 with CPU, 8K bytes cache, 2M bytes memory, 650K-byte disk, power supplies, four RS-232 ports, Ethernet, two-user Unix license, C language, TCP/IP[5]

COMPANY	PRODUCT	DATE FIRST INSTALLED	PRIMARY MARKET[1]	MOST COMPARABLE DEC OR IBM SYSTEM	PERFORMANCE (MIPS)	MACHINE CYCLE TIME (NSEC)	MEMORY RANGE (MEGABYTES)	DISK TRANSFER RATE (MEGABIT/SEC.)	DISK CAPACITY (MEGABYTES)	NUMBER OF PORTS	OPERATING SYSTEMS	MAXIMUM NUMBER OF USERS	TYPICAL NUMBER OF USERS	WORD LENGTH (BITS)	BASE PRICE
Harris Corp. Computer Systems Division (800) 4-HARRIS	MCX-3 Model 50	February 1987	SE	Microvax II	4.1	60	2-8	650K-2.4M	86-690	19	Unix System V	32	2-16	32	$24,500 with CPU, 8K bytes cache, 2M bytes memory, 650K-byte disk, three RS-232 ports, power supplies, Ethernet, two-user Unix license, C language, TCP/IP
	MCX-3 Model 60	January 1986	SE, OA	VAX 8250	10.5	60	2-32	650K-2.4M	NP	19	Unix System V	32	2-16	32	$32,400 with CPU, 8K bytes cache, 2M bytes memory, 650K-byte disk, three RS-232 ports, two-user Unix license, C language, power supplies
	H60	June 1984	SE	NP	0.88	300	1.5-12	2.4	NP	48	VOS, RT-VOS, VUE (VOS/Unix environment)	48	NP	32, 48	$48,000
	H700	April 1983	SE	NP	0.88	300	768K-12M	2.4	NP	128	VOS, VUE, RT-VOS	128	NP	32, 48	$56,000
	H800	August 1982	SE	NP	1.58	150	768K-12M	2.4	NP	128	VOS, RT-VOS, RT-VOS/MP, VUE	128	NP	32, 48	$164,000
Hewlett-Packard Co. (800) 752-0900	HP 3000 Series 925	May 1988	DP, TP	VAX 3600, 6210; AS/400 Model B40	NP	80	32-48	NP	NP	152	MPEXL	152	30-80	32	$80,000 with 32M bytes memory, operating system, HP SQL database, LAN
	HP 3000 Series 58	NP	DP, TP	IBM 9370-40/60; VAX 3500, 3600	NP	105	4-8	NP	NP	152	MPE	152	30-50	16	$76,490
	HP 3000 Series 52	NP	DP, TP	IBM 9370-40; VAX 3500	NP	105	4-8	NP	NP	60	MPE	92	20-40	16	$45,890 with 4M bytes memory, operating system, database
	HP 9000 Model 8355	July 1988	OA, SE	Microvax III	NP	66	8-112	1-5	NP	30	HP-UX	30	10-20	32	$45,000 with 8M bytes memory, HP-IB card, multiplexer card, operating system
	Model 8255	June 1987	OA, SE	Microvax III	NP	80	8-112	1-5	NP	64	NP	64	15-20	32	$35,000 with 8M bytes memory, HP-IB card, multiplexer card, operating system
Honeywell Bull, Inc. (617) 895-6000	DPS 6 Plus Model 210	June 87	DP, OA, TP	Microvax II; AS/400 Model 10	0.7	200	2-16	625K	37-1.5G	58	HVS-6 Plus	40	4-10	32	$17,130 with CPU, 2M bytes memory, 37M-byte disk, 60M-byte cartridge tape, six ports, operating system software license, one-year warranty
	DPS 6 Plus Model 220	June 1987	DP, OA, TP	Microvax II; AS/400 Model 20	1	200	4-16	625K	37-1.5G	58	HVS 6 Plus	40	11-20	32	$25,130 with CPU, 4M bytes memory, 37M-byte disk, 60M-byte cartridge tape, six ports, operating system software license, one-year warranty
	XPS-100 series Model 15	June 1988	DP	Microvax 2000	1.7 (2.1 with cache)	16.7 MHz	2-26	5	72-216	36	Unix System V	32	8	32	$11,245
	XPS-100 series Model 22	August 1988	DP	Microvax II	1.7 (2.1 with cache)	16.7 MHz	4-12	19	157-807	54	Unix System V	48	24	32	$20,495
	XPS-100 series Model 42	August 1988	DP	Microvax 3600	3.7 (including cache)	16.7 MHz	8-24	10	157M-1.8G	108	Unix System V	96	48	32	$41,495
	DPS 6 Plus Model 420	August 1986	DP, OA, TP	AS/400 Model B60	1-4	200	8-64	1.2-1.8	142M-7.2G	64-12	HVS-6	160	40-120	32	$193,000
	DPS 6 Plus Model 410	June 1986	DP, OA, TP	AS/400 Model B40, B50	1-4	200	4-16	1.2-1.8	142M-7.2G	16-160	HVS-6	64	24-48	32	$57,000
	DPS 6 PLus Model 400	March 1987	DP, OA, TP	System/36, 38, AS/400 Model B30	1-2	200	2-8	1.2-1.8	142-595	8-48	HVS-6 Plus	48	12-25	32	$33,000 with CPU, 2M bytes memory, communications controller, four ports, 5¼-in. disk
	DPS 6 Plus Model 410	September 1986	DP, OA, TP	AS/400 Models B40, B50	1-4	200	4-16	1.2-1.8	142-595	12-64	HVS-6 Plus	64	24-48	32	$57,000 with CPU, 4M byte memory, peripheral controller, 5¼-in. disk, communications controller, four ports, operating system with license
	DPS 6 Plus Model 420	August 1986	DP, OA, TP	AS/400 Model B60	1-4	200	8-64	1.2-1.8	142-595	16-160	HVS-6 Plus	160	40-120	32	$93,000 with CPU, 8M bytes memory, peripheral controller, 5¼-in disk, communications controller, four ports, operating system license
	DPS 7000 Model 30	August 1987	DP, TP	IBM 9370, AS/400	NP	150	2-16	1.8	NP	4-8	GCOS 7	NP	80	32	$100,000 with CPU, 8M bytes memory, four ports, console
	DPS 7000 Model 20	August 1987	DP, TP	IBM 9370, AS/400	NP	150	2-16	1.8	NP	4	GCOS 7	NP	30	32	$70,000 with CPU, 8M bytes memory, four ports, console
IBC/Integrated Business Computers (818) 882-9007	IBC 386:40	March 1988	DP	NA	4	120	1-24	32	760	8-40	SCO Xenix 386, Theos 386, Pick	40	20	32	$9,000 with 77M-byte hard disk, eight serial ports, 2M-byte memory
	IBC 386:120	March 1988	DP	NA	4	120	1-24	32	2.2G	8-20	SCO Xenix 386, Theos 386, Pick	120	50	32	$10,000 with 77M-byte hard disk, eight serial ports, 2M bytes memory
IBM (800) 246-2468	ES/9373 Model 20	Third-quarter 1987	DP	NA	0.5*	90	4-16	2.2	6.6G	64	VSE, VM, IX/370, Pick	NP	NP	64	$25,000 with 4M bytes memory
	ES/9373 Model 30	NP	DP, OA, SE	Microvax	NP	80	4-16	2.2	6.6G	64	VSE, VM, IX/370, Pick	384	NP	64	$37,000
	ES/9375 Model 40	Third-quarter 1987	DP	NA	0.5*	90	8-16	3	1.3G	384	VSE, VM, IX/370, MUMPS, VM, Pick	NP	NP	64	$55,000 with 8M bytes memory
	ES/9375 Model 50	NP	DP, OA, SE	Microvax	NP	80	8-16	3	2G	384	VSE, VM, IX/370, MUMPS, VM, Pick	NP	NP	64	$70,000
	ES/9375 Model 60	Third-quarter 1987	NP	NA	1.3*	90	8-16	3	1.3G	384	VSE, VM, IX/370, MUMPS, VM, Pick	NP	NP	64	$72,000
	ES/9377 Model 80	NP	DP, OA, SE	Microvax 3000	NP	66.7	8-16	3	3.9G	384	VSE, VM, IX/370, MUMPS, VM, Pick	384	NP	64	$142,000
	ES/9377 Model 90	Third-quarter 1987	NP	NA	2.6*	50	8-16	3	3.9G	384	VSE, VM, IX/370, MUMPS, VM, Pick	NP	NP	64	$199,500
	System/36 Model 5360	August 1983	DP, OA	NA	0.35*	NP	256K-7M	1.5	1.4G	16	SSP[7]	72	NP	16	$42,000-$105,000
	System/36 Model 5362	January 1984	DP, OA	NA	0.20*	NP	256K-2M	1.25-2.5	720	4	SSP	64	NP	16	$15,750-$26,250
	System/36 Model 5363	October 1987	DP, OA	NA	NP	100	1-2	10	105-420	28	SSP	NP	6-15	16	$10,500-$17,195
	System/36 Model 5364	August 1985	DP, OA	NA	0.05*	NP	512K-1M	625K-1.25M	130	2	SSP	64	NP	16	$6,295
	System/36 Model B10	August 1988	DP, OA, TP	NA	NP	120	4-8	1.25	NP	NP	OS/400	NP	NP	32, 48	$23,690 with system unit, tape cartridge unit, twin-axial workstation controller, OS/400, modem, supplies kit
	System/36 Model B20	August 1988	DP, OA, TP	NA	NP	120	4-16	1.25	NP	NP	OS/400	NP	NP	32, 48	$42,190-$54,440 with system unit, tape cartridge unit, twin-axial workstation controller, OS/400, modem, supplies kit

COMPANY	PRODUCT	DATE FIRST INSTALLED	PRIMARY MARKET[1]	MOST COMPARABLE DEC OR IBM SYSTEM	PERFORMANCE (MIPS)	MACHINE CYCLE TIME (NSEC)	MEMORY RANGE (MEGABYTES)	DISK TRANSFER RATE (MEGABIT/SEC.)	DISK CAPACITY (MEGABYTES)	NUMBER OF PORTS	OPERATING SYSTEMS	MAXIMUM NUMBER OF USERS	TYPICAL NUMBER OF USERS	WORD LENGTH (BITS)	BASE PRICE
IBM (800) 246-2468	9373 Model 20	July 1987	DP, OA, SE, TP	NA	0.5	NP	0.14	NP	NP	NP	VM/SP, VM/IS, VSE/SP, IX/370	NP	20-50	32	$32,550 with 4M bytes memory
	9375 Model 40	October 1987	DP, OA, SE, TP	NA	0.5	90	8-16	3	NP	NP	VM/SP, VM/IS, VSE/SP, IX/370	NP	NP	32	$68,250 with 8M bytes of memory
	9375 Model 60	October 1987	DP, OA, SE, TP	NA	1.3	90	8-16	3	NP	NP	VM/SP, VM/IS, VSE/SP, IX/370	NP	NP	32	$97,650 with 8M bytes of memory
Icon International, Inc. (800) 444-4266	Icon 2000/5	July 88	DP, OA, TP	Microvax II; IBM RT	2.5	187	4-48	1.5	160-614	16	Unix BSD 4.2, Unix System V.2, Pick R83+	16	16	32	NP
	Icon 2000	January 1986	DP, OA, TP	Microvax II; IBM RT	2.5	187	4-48	1.5	160-614	32	Unix BSD 4.2, Unix System V.2, Pick R83+, MS-DOS	32	32	32	NP
	Icon 3000	March 1987	DP, OA, TP	VAX 8200	4	150	4-48	1.5	160-614	64	Unix BSD 4.2, Unix System V.2, Pick R83+, MS-DOS	64	48	32	NP
	Icon 4000	March 1988	DP, OA, TP	VAX 8300, 8500	4	150	4-112	3	160M-32G	128	Unix BSD 4.2, Unix System V.2, Pick R83+, MS-DOS	128	80	32	NP
MAI Basic Four, Inc. (714) 731-5100	MAI 1800	October 1987	DP, TP	NP	NP	10 MHz	1.6-2.6	5	31-230	19	MS-DOS, BOSS/IX	18	8-15	16	$6,200 with 1.6M bytes memory, 31M-byte disk, monitor, operating system
	MAI 2500	October 1988	DP, TP	AS/400 Model B10	NP	16 MHz	1-4	5	44-160	15	BOSS/IX	14	3-8	32	$10,595 with 1M byte memory, 44M-byte disk, six serial ports, one parallel port, power supply
	MAI 3000	December 1986	DP, TP	AS/400 Model B20	NP	16 MHz	Up to 10	5	71-480	35	BOSS/IX	34	6-20	32	$14,450 with 71M byte disk, 10 serial ports, one parallel port, power supply
	MAI 4000	January 1988	DP, TP	AS/400 Model B30	NP	16 MHz	8-16	5	480-1120	77	BOSS/IX	74	15-30	32	$45,895 with 8M bytes memory, 320M-byte disk, 34 serial ports, three parallel ports, power supply
	MAI 7100 series	March 1987	DP, OA, TP	AS/400 Model B20	NP	160	2-6	5 MHz	169M-2.2G	56	BOSS/VS	52	15	16, 32	$24,750 with CPU, 2M bytes memory, four ports, 169M-byte disk, 120M-byte cartridge tape
	MAI 9400 series	January 1988	DP, OA, TP	AS/400 Model B30	NP	160	4-12	5 MHz	250M-2.4G	120	BOSS/VS	116	30	32	$51,950 with CPU, 4M bytes memory, four ports, 250M-byte disk, 120M-byte cartridge tape
	MAI 9600 series	January 1988	DP, OA, TP	AS/400 Model B40	NP	160	4-24	10 MHz	300M-3.6G	259	BOSS/VS	255	40	32	$61,950 with CPU, 64K bytes cache, 4M bytes memory, four ports, 300M-byte disk, magnetic tape controller
	Advanced Series 40	June 1988	DP, OA, TP	AS/400 Model B50	NP	80	4-16	10 MHz	300M-7.1G	136	BOSS/VS	132	50	32	$71,180 with CPU, 4M bytes memory, 20 ports, 300M-byte disk, magnetic tape controller
	Advanced Series 60	June 1988	DP, OA, TP	AS/400 Model B60	NP	80	4-24	20 MHz	621M-9.9G	259	BOSS/VS	255	65	32	$133,595 with CPU, 128K-byte cache, 4M bytes memory, 20 ports, 621M-byte disk, magnetic tape controller
McDonnell Douglas Computer Systems Co. (714) 250-1000	Series 6000	1984	OA	Microvax II; System/36, 38	NP	150	512K-4M	5-20	NP	8-120	Reality	120	50	16	$17,850 with 512K bytes memory, 75M byte disk storage, 8 ports, 1/4 cartridge tape, operating system
Mips Computer Systems, Inc. (408) 720-1700	M/2000	August 1988	SE	VAX 8800	20	40	32-128	3	17G	68	RISC/OS	NP	NP	32	$118,000 with 32M bytes memory, console, 715K byte disk, cartridge tape, operating system software
	M/120	June 1988	SE	Microvax 3500	12	60	8-48	1	2G	33	RISC/OS	NP	NP	32	$30,000 with 8M bytes memory, console, 328M-byte disk, cartridge tape, operating system
Modular Computer Systems, Inc. (305) 974-1380	Classic II/15	1984	SE	NA	0.2	400	Up to 2	NP	NP	NP	Max IV	16	NP	NP	$13,500 with 512K bytes memory
	Classic II/25	1982	SE	NA	0.3	250	128K-1M	NP	NP	NP	Max IV	64	NP	16	$27,300 with 512K bytes memory
	Classic II/45	1982	SE	NA	0.7	250	Up to 2	NP	NP	NP	Max IV	128	NP	16	$40,000 with 1M byte memory
	Classic II/75	1982	DP	NA	1	125	1-4	NP	NP	NP	Max IV	256	NP	16	$86,600 with 1M byte memory, console, power supplies
	Power 45	1987	SE	NA	0.7	250	Up to 2	5	NP	NP	Max IV	128	NP	16	$72,800 with 2M bytes memory, 166M-byte disk and tape
Motorola, Inc. Computer Systems Division (408) 255-0900	System 8000 Model 850	September 1988	OA, TP	NP	6.5	NP	8-64	9	2.8G	2-128	Unix System V/68	128	96	32	$21,500 with 8M bytes memory, two ports, power supplies
	System 8000 Model 650	September 1988	OA, TP	NP	6.5	NP	8-32	9	2.3G	2-66	Unix System V/68	66	2-66	32	$14,500 with 8M bytes memory, two ports, power supplies
	System 8000 Model 610	September 1988	OA, TP	NP	4.2	NP	4-8	1.5	1.2G	4-20	Unix System V/68	20	4-20	32	$14,000 with 4M bytes memory, four ports, power supplies
	System 8000 Model 310	April 1988	OA, TP	NP	4.2	NP	4-8	1.25	600	4-12	Unix System V/68	12	4-12	32	$9,000 with 4M bytes memory, four ports, power supplies
	System 8000 Model 400E	June 1986	OA, TP	NP	2.5	NP	4-16	1.5	644	2-34	Unix	34	28	32	$4,400 with 4M bytes memory, two ports, power supplies
	System 8000 Model 100	June 1987	OA, TP	NP	2.5	NP	2-4	0.12	161	2-10	Unix	10	2-10	32	$4,450 with 2M bytes memory, two ports, power supplies
	System 8000 Model 150	January 1988	OA, TP	NP	3	NP	4-4	0.12	161	2-6	Unix System V/68	6	1-6	32	$8,005 with 4M bytes memory, 67M-byte disk, 60M-byte tape drive, two ports, power supplies
NCR Corp. (Contact local NCR office)	Tower 32/200	Third-quarter 1988	DP, OA	NP	NP	NA	1-8	NP	102	4	Unix	4	4	32	$5,445
	Tower 32/650	May 1988	DP	NP	NA	40	2-16	1.5	760	64	Unix System V	64	16	32	$24,915
	Tower 32/450	May 1988	DP	NP	NA	40	2-8	1.5	380	32	Unix System V	32	8	32	$15,565
	9811	NP	DP, TP	System/88, 9370, 4381	1	145	8-32	1.5	NP	10-19	VRX/E	NP	NP	32	$58,960 with application processor, data storage processor, 8M bytes memory, 10 channels, console, operating system
	9821	NP	DP, TP	System/88, 9370, 4381	2	145	12-48	1.5	NP	17-33	VRX/8	NP	NP	32	$86,490 with two application processors, data storage processor, 12M bytes memory, 17 channels, console, operating system
	9800 Extended Support Processor	NP	DP, TP	NA	NP	230	1-16	5	NP	48	Unix	32	16	32	$25,675 with 2M bytes memory, 48 ports, 8M-byte disk, tape drive, operating system
NEC Information Systems, Inc. (508) 264-8000	Astra Micro XL	February 1988	DP	Microvax	1-2.5	NP	2-6	15-28	520	8	Astr-IX	16	3	32	$5,895 with 2M bytes memory, 1.2M-byte floppy disk drive, eight ports, floating-point processor, operating system
	Astra XL/8	February 1988	DP	Microvax	1-2.5	NP	2-10	15-28	520	8	Astr-IX	8	4	32	$9,395 with 2M bytes memory, 1.2M-byte floppy disk drive, eight ports, floating-point processor, operating system

COMPANY	PRODUCT	DATE FIRST INSTALLED	PRIMARY MARKET[1]	MOST COMPARABLE DEC OR IBM SYSTEM	PERFORMANCE (MIPS)	MACHINE CYCLE TIME (NSEC)	MEMORY RANGE (MEGABYTES)	DISK TRANSFER RATE (MEGABIT/SEC.)	DISK CAPACITY (MEGABYTES)	NUMBER OF PORTS	OPERATING SYSTEMS	MAXIMUM NUMBER OF USERS	TYPICAL NUMBER OF USERS	WORD LENGTH (BITS)	BASE PRICE
NEC Information Systems, Inc. (508) 264-8000	Astra XL/16	February 1988	DP	Microvax	1-2.5	NP	2-18	15-28	4G	8	Astr-IX	16	8	32	$12,995 with 2M bytes memory, 1.2M-byte floppy disk drive, 8K bytes cache, eight ports, floating-point processor, operating system
	Astra XL/32	February 1988	DP	Microvax	1-2.5	NP	2-34	15-28	4G	8	Astr-IX	32	16	32	$16,495 with 2M bytes memory, 16K bytes cache, 1.2M-byte floppy disk drive, eight ports, floating-point processor, operating system
Pixar (415) 258-8100	Pixar II Image Computer	January 1988	SE	NA	NP	85	12-192	8.5	NP	NP	Unix, VMS	1	NP	96	$29,500 with 12M bytes memory
Plexus Computers, Inc. (408) 943-9433	Plexus P/90	June 1987	DP	System/36; VAX	4	25 MHz	2-16	1.25	3.5G	36	Unix System V	32	16	32	$29,500 with 2M bytes memory, 67M-byte disk, eight serial ports, tape cartridge drive, power supply
	Plexus P/95	May 1987	DP	IBM 4300; VAX 8600	4	40-120	4-48	3	6.7G	36	Unix System V	128	64	32	$55,000 with 4M bytes memory, 142M-byte disk, 16 serial ports, cartridge tape, power supplies
Point 4 Data Corp. (714) 259-0777	Mark 2E	December 1986	DP	NA	3.5	260	256K-1M	0.6	53-190	4-17	Iris	17	8	16	$11,395 with 256K bytes memory, four ports, 53M-byte disk, 60M-byte streamer
	Mark 12E	May 1988	DP	System/36, 38	15	64	Up to 16	1.9	170-383 per drive	128	Iris	128	64	16	$39,900 with 2M bytes memory, eight ports, 170M-byte disk, 150M-byte tape, streamer
Prime Computer, Inc. (508) 655-8000	Model 4050	April 1987	DP, OA, SE, TP	Microvax 3500, 3600, VAX 6210	2.8	82	16-32	2.46	NP	4	Primos	128	50	32	$88,000 with 16M bytes memory, 496M-byte disk, system console, Primos
	Model 2455	July 1987	DP, OA, SE, TP	Microvax II	1.6	120	4-12	1.8	NP	1	Primos	40	20-30	32	$62,810 with 4M bytes memory, 258M-byte disk, four asynch lines, 60M-byte cartridge tape, system console, Primos
	Model 2450	February 1986	DP, OA, SE	Microvax II	1.3	160	4-8	1.5	NP	1	Primos	40	15-20	32	$46,560 with 4M bytes memory, 258M-byte disk, 60M-byte cartridge tape, four asynch lines, system console, Primos
	Model 2350	February 1986	DP, OA, SE	Microvax II	0.85	160	4-8	1.5	NP	1	Primos	32	10	32	$19,900 with 4M bytes memory, 84M-byte disk, 60M-byte cartridge tape, eight asynch lines, one synch line, system console, Primos
Proteus Technology Corp. (800) 782-8387	3400M System	July 1988	DP, OA, SE, TP	System/36	6	100	2-16	840K	40-700	Up to 64	Unix, Xenix, Pick	64	16-32	32	$4,899 with 2M bytes memory, 40M-byte hard disk, eight ports, 200W power
Qantel Business Systems, Inc. (415) 887-7777	System 68	November 1987	TP	System/38	NP	77	8-16	NP	NP	14	Best/AOS	100	25-30	8	$74,050 with 8M bytes memory, CPU, 160M-byte disk, tape drive, disk and tape controller, four-channel video netowrk controller, 14-slot I/O backplane
	System 65	November 1987	TP	System/38	NP	77	4-16	NP	NP	8	Best/AOS	100	20-24	8	$37,800 with 4M bytes memory, CPU, 160M-byte disk, cartridge tape, disk and tape controller, video network controller
	System 55	February 1986	TP	System/36	NP	72	2-4	NP	NP	8	Best/AOS	64	15-16	8	$30,800 with CPU, 2M bytes memory, eight-slot I/O backplane, cabinet, four-channel video network controller, 160M-byte disk, disk and tape controller
	System 45XP	March 1987	TP	System/36	NP	77	512K-1M	NP	NP	8	Best/AOS	32	10-12	8	$21,800 with CPU, 512K bytes memory, eight-slot I/O backplane, cabinet, four-channel video network controller, disk and tape contoller
	System 43	April 1987	TP	NP	NP	77	512K-1M	NP	NP	3	Best/AOS	32	10-12	8	$13,450 with CPU, 512K bytes memory, terminal controller, cartridge tape, cabinet, three-slot I/O backplane, 45M-byte disk, disk and tape controller
	System 15	February 1987	TP	NA	NP	308	512K-1M	NP	NP	NA	Best/AOS	8	4-6	8	$12,950 with CPU, 512K bytes memory, 84M-byte hard disk, disk/floppy controller, cartridge tape, terminal/tape controller
Ridge Computers (408) 262-2199	Ridge 3200 Model 95	August 1987	SE	VAX 8700	5	83.3	4-128	NP	NP	16	NP	64	32	32	$64,800 with 16M bytes memory, four ports, power supplies
Tandem Computers, Inc. (408) 725-6000	Nonstop EXT10	August 1986	TP	IBM 9375-60, 4381-22, AS/400 Model B60	1.7-3.4	100	8-32	1.2	26G	144-288	Guardian 90	912	150	16	$74,900 with two processors, 16M bytes memory, 256K-byte disk storage, 5120 cartridge tape, batteries, system cabinet, power supplies
	Nonstop CLX	Fourth-quarter 1987	TP	IBM 9375-60, 4382-92E	1-6	133	12-72	1.2	9.8G	3-612	Guardian 90	3-612	50-300	32	$57,000 with CLX processor, 6M bytes memory, two 145M-byte disk drives, cartridge tape drive, power supply
	Tandem LXN	January 1987	TP	VAX 1100/780; 8100; System/36	NP	16.7-20 MHz	2-16	10	510	10	Unix System V	32	18-24	32	$23,700 with 2M bytes memory, disk and file controllers, 60M-byte cartridge tape, 5¼-in. disk drive, 80M-byte hard disk, serial communications controller
Texas Instruments, Inc. (800) 527-3500	System 1200	May 1988	DP	AS/400 Model B10	2.8	250	2-16	1.25	48M-1.8G	8-24	TI System V	24	8	32	$10,910 with 2M bytes memory, terminal, 48M-byte disk, eight ports, 80386 microprocessor, 8K-byte cache memory
	System 1300	December 1987	DP	AS/400 Model B10	4	200	4-16	1.25	87M-1.8G	16-32	TI System V	32	16	32	$22,595 with 4M bytes memory, terminal, 87M-byte disk, 60M-byte tape backup, 16 ports, 80386 microprocessor, 16K bytes cache
	System 1500	October 1986	DP	VAX 8250, 8350	2.5 per processor	NP	2-40	1.81	NP	256	Unix System V	128	85	32	$59,000
Third Coast Technologies, Inc. (415) 570-4641	Talos-386/20	July 1987	OA	NP	5	50	2-16	1M	125M-3.1G	19-51	Interactive Systems 386.IX, Unix System V.3, SCO Xenix 386, VP/IX DOS emulation, Theos-386, Pick R83, OA	32	17	32	$15,500 with 2M bytes memory, 125M-byte disk capacity, 125M-byte tape drives, 17 ports, 300W power supply
The Ultimate Corp. (201) 887-9222	3000 series	December 1986	DP	NA	NP	165	2-4	1.21	NP	96	Ultimate	96	16-72	16	$69,000 with CPU, operating system, DBMS, 2M bytes memory, 344M-byte disk, tape
	1400 series	June 1987	DP	NA	NP	60	4-12	1.21	NP	64	Ultimate	64	4-48	32	$18,500 with CPU, operating system, DBMS, 2M bytes memory, 72M-byte disk, tape drive
Unisys Corp. (215) 542-4011	AI Model F	September 1987	DP, TP	IBM 9370-G40, AS/400 Model B10	NP	NP	12-48	1.2	256K-4G	NP	MCP/AS	NP	10-25	48	$25,000 with CPU, 12M bytes memory
	U6000/50	April 1988	DP, TP, SE, OA	System/36, AS/400; Microvax II, Microvax 3000	NP	20	4-64	1.6	170M-2.28G	32	Unisys System V	32	10-24	32	$24, 500 with CPU, 4M bytes memory, 170M-byte disk, AT-compatible floppy, 150M-byte tape, power supply
	U5000/35	June 1988	DP, TP, OA	System/36, AS/400; Microvax II, Microvax 3000	NP	25	4-8	2.5	170M-4.42G	32	Unisys System V	32	6-14	32	$24,500 with CPU, 4M bytes memory, 170M-byte disk, 150M-byte tape, eight-port asynchronous controller

COMPANY	PRODUCT	DATE FIRST INSTALLED	PRIMARY MARKET[1]	MOST COMPARABLE DEC OR IBM SYSTEM	PERFORMANCE (MIPS)	MACHINE CYCLE TIME (NSEC)	MEMORY RANGE (MEGABYTES)	DISK TRANSFER RATE (MEGABIT/SEC.)	DISK CAPACITY (MEGABYTES)	NUMBER OF PORTS	OPERATING SYSTEMS	MAXIMUM NUMBER OF USERS	TYPICAL NUMBER OF USERS	WORD LENGTH (BITS)	BASE PRICE
Unisys Corp. (215) 542-4011	U5000/55	June 1988	DP, TP, OA	System/36, AS/400; Microvax II, Microvax 3000	NP	25	4-16	2.5	170M-4.8G	64	Unisys System V	64	14-32	32	$33,900 with CPU, 4M bytes memory, 170M-byte disk, 150M-byte tape, eight-port asynchronous controller
	U5000/85 UP	January 1988	DP, TP, OA	System/36, AS/400; Microvax II, Microvax 3000	NP	25	4-64	2.5	170M-1.9G	80	Unisys System V	80	16-64	32	$39,900 with CPU, 4M bytes memory, 170M-byte disk, 150M-byte tape, 16 communications lines
	U5000/85 DP	January 1988	DP, TP, OA	System/36, AS/400; Microvax II, Microvax 3000	NP	25	4-64	2.5	337M-8.1G	80	Unisys System V	80	16-64	32	$54,900 with dual CPUs, 4M bytes memory, 170M-byte disk, 150M-byte tape, 16 communications lines
	U5000/95 UP	January 1988	DP, TP, OA	System/36, AS/400; Microvax II, Microvax 3000	NP	25	8-64	2.5	337M-8.1G	128	Unisys System V	128	32-64	32	$68,000 with CPU, 8M bytes memory, 337M-byte disk, 150M-byte tape, 16 communications lines
	U5000/95 DP	January 1988	DP, TP, OA	System/36, AS/400; Microvax II, Microvax 3000	NP	25	8-64	2.5	20M-2.3G	128	Unisys System V	128	32-64	32	$83,000 with dual CPUs, 8M bytes memory, 337M-byte disk, 150M-byte tape, 16 communications lines
	B38	March 1987	DP, TP, OA	System/36, AS/400; Microvax II, Microvax 3000	NP	16	1-4	0.6	NP	20M-2.3G	BTOS, MS-DOS	64	12-64	16, 32	$5035 with 1M byte memory, power supply, four ports
Wang Laboratories, Inc. (508) 459-5000	VS 5000	July 1988	DP, OA, TP	AS/400, 9370; Microvax II, VAX 2000	NP	25-53.3 MHz	1-16	1.25	NP	Up to 96	VSOS, IN/LX	64	Up to 64	32	$8,800 with 1M byte memory, CPU, 25-Mhz clock speed, 72M byte disk, four ports
Wicat Systems, Inc. (800) 453-1145	Wicat S-2255	January 1988	DP, OA, SE, TP	VAX-11/780	4	240	4-12	10 MHz	36-600	4-28	Unix System V, WMCS	28	22	32	$23,700 with 4M bytes memory, four ports, 68020 math coprocessor, 48M-byte hard disk
	Wicat S-2250	January 1988	DP, OA, SE, TP	VAX-11/780	4	240	4-12	10 MHz	36-300	4-20	Unix System V, WMCS	20	16	32	$19,900 with 4M bytes memory, four ports, 68020 math coprocessor, 48M-byte disk drive
	Wicat S-3220	January 1988	DP, OA, SE, TP	NP	4	240	4-12	10 MHz	84M-2G	16-64	Unix System V, WMCS	64	50	NP	$43,820 with 16 ports, 4M bytes memory, 68020C math coprocessor, 84M-byte disk
	Wicat S-2260	January 1988	DP, OA, SE, TP	VAX-11/780	4	240	4-12	10 MHz	84M-2G	4-36	Unix System V, WMCS	36	30	32	$31,370 with four ports, 4M bytes memory, 68020 math coprocessor, 84M-byte disk

Conformity

FROM PAGE 86

their applications run well.

Since small users do not usually have the resources in-house to handle new applications programming or migration, outside help most likely will be called in. Thus, the possibility of finding contract labor familiar with a particular operating system matters more than the beauty of the operating system.

The urge to serve

As mentioned earlier, the low-end minicomputer is being pushed into a new role in the corporation, that of file server. According to Sierra Group's Gruhn, this push is coming from users who are saying, "I have all these PCs, and I own a database; what I need is a file server."

Looking at the past year's worth of product releases and listening to rumors of products yet to come, it is apparent that vendors are heeding what users are saying. Almost all of the small systems vendors are trying to downsize their machines and work them into a file server position.

About a dozen Intel 80386-based low-end computers that can function as either a mini or a file server were introduced in the past year. Most have included the standard Unix operating system.

These include Altos Computer Systems, Inc.'s Series 1000 and Model 20; Cubix Corp.'s 3/386; Counterpoint Computers, Inc.'s System 15; Corollary, Inc.'s 386/MP; Proteus Technology Corp.'s System 3400M; and Teradata Corp.'s DBC/1012 Model 3.

Data General Corp. and Wang Laboratories, Inc. are also actively pursuing PC integration, allowing their low-end computers to serve, rather than master, desktop machines.

DEC's Microvaxes, including the recently introduced 3500s and 3600s, can also be used as file servers in a local-area Vaxcluster.

And, as noted, IBM's AS/400 can be used as a file server or minicomputer.

Sierra Group, which does an annual price/performance critique, including maintenance and the cost of software, finds this year that the overall price cuts have been steepest in the 50- to 100-user machines.

"The conventional wisdom is that the price drops have been at the low end," Sierra's Gruhn says, "but in reality the [50-to-100-user] systems dropped 20% in effective cost." Overall, Gruhn says, prices have dropped about 5% in the past year, while vendors are bundling more functionality into the machines.

The largest cost savings has been in hardware maintenance. Now most users are able to count on more than a 50% reduction from 1986 levels.

Users worry about the total cost of owning a system after one is bought. For new customers, total price matters, but it means little if users don't know what they are getting for that price.

Realistic benchmarking is an important issue in any class of machines, but it is even more crucial for the small user with a small pocketbook who must pay particular attention to obtaining the best deal for the application. MIPS ratings may tell you how fast a CPU can run, but that can be like knowing how fast one can rev up a car's engine in neutral: These ratings are of little use in finding the speed of certain applications.

> THE PAST FEW years have not exhibited any signs of the "shakeout" of low-end vendors that the industry has been watching for.

This annoyance has yet to bring a cohesive standard of measurement to the industry, but it is one step closer. Benchmarks, or some tangible numbers with which to measure the performance of competitive systems, have become important to the vendors as well as users during the past year.

In August, seven hardware and software companies announced the formation of the Transaction Processing Performance Council. Perhaps by next year, the committee will have a more standardized benchmark to help with buying decisions.

The past few years have not exhibited any signs of the "shakeout" of low-end vendors that the industry has been watching for. Instead of small companies disappearing off the face of the earth, the industry is beginning to see consolidations.

Infocorp's Sill-Holeman notes that rather than the high-profile acquisitions, such as the merger between Unisys and Convergent Technologies, Inc., most consolidations are of the agreement or partnership nature, where symbiosis can offer more than individual presentations.

Since the beginning of 1988, there has been a flood of marketing, distribution and software development agreements between companies.

For instance, Altos announced cooperation with Pick operating systems software vendors, a move that allows testing and certification for the software products. Floating Point Systems, Inc. bought up the remainders of Celerity Computing, so those with Celerity systems aren't left hanging out to dry without support for their equipment.

This trend toward cooperation and consolidation offers a broader range of applications that are more likely to run well on the hardware involved. It also gives users who buy from small companies more assurance that someone will survive to service their machines. •

ALUMINUM
Disc Pack Cases ● Mag Tape Reel Cases

#5142
DATA MODULE CASE
1 3348
Data Module
or equivalent

#5125
1 to 10 Canisters
#5126
1 to 14 Thinline
#5127
1 to 18 Tapeseal
or EZ-II

#5140
DISC PACK CASE
CAPACITY —
1 3336 Disc Pack
3 Phoenix Cartridges
3 5440 Cartridges
5 2315 Cartridges

#5110
1 to 5 Canisters
#5115
1 to 7 Thinline
#5120
1 to 9 Tapeseal
or EZ-II

See your local dealer, or call/write —
DIVISION OF BY-LO MFG. INC.
ALUMINUM CASE CO.
3333 W. 48th Pl. • Chicago, Illinois 60632
(312) 247-4611

Pass along readers, unite!

Demand your own copy of Computerworld.

YES, I want to receive my own copy of COMPUTERWORLD each week. I accept your offer of $44* per year — saving over 56% off the single copy price. In addition, as a subscriber, I understand I will receive bonus issues of COMPUTERWORLD FOCUS at no extra charge.

First Name MI Last Name

Title Company

Address

City State Zip

Address Shown: ☐ Home ☐ Business Single Copy Price: $2.00

* U.S. Only. Canada, Central America & South America $110/Europe $165. All countries $245 (Airmail). Foreign orders must be prepaid in U.S. dollars.

Please complete the information to the right to qualify for this special rate.

COMPUTERWORLD

1. **BUSINESS/INDUSTRY** (Circle one)
   - 10. Manufacturer (other than computer)
   - 20. Finance/Insurance/Real Estate
   - 30. Medicine/Law/Education
   - 40. Wholesale/Retail/Trade
   - 50. Business Service (except DP)
   - 60. Government — State/Federal/Local
   - 65. Communications Systems/Public Utilities/Transportation
   - 70. Mining/Construction/Petroleum/Refining/Agric
   - 80. Manufacturer of Computers, Computer-Related Systems or Peripherals
   - 85. Computer & DP Services, including Software/Service Bureau/Time Sharing/Consulting
   - 90. Computer/Peripheral Dealer/Distributor/Retailer
   - 75. User: Other _____
   - 95. Vendor: Other _____ (Please specify)
2. **TITLE/FUNCTION** (Circle one)
   - **IS/MIS/DP MANAGEMENT**
   - 19. Vice President, Asst. VP
   - 21. Dir., Mgr., Suprv., IS/MIS/DP Services
   - 22. Dir., Mgr., Suprv., of Operations, Planning, Adm. Services
   - 23. Dir., Mgr., Suprv., Analyst, of Systems
   - 31. Dir., Mgr., Suprv., of Programming
   - 32. Programmer, Methods Analyst
   - 35. Dir., Mgr., Suprv., OA/WP
   - 38. Data Comm. Network/Systems Mgt
   - **OTHER COMPANY MANAGEMENT**
   - 11. President, Owner/Partner, General Mgr
   - 12. Vice President/Asst. VP
   - 13. Treasurer, Controller, Financial Officer
   - 41. Engineering, Scientific, R&D, Tech. Mgt
   - 51. Sales/Mktg. Mgt
   - **OTHER PROFESSIONALS**
   - 60. Consulting Mgt
   - 70. Medical, Legal, Accounting Mgt
   - 80. Educators, Journalists, Librarians, Students
   - 90. Others _____ (Please specify)
3. **COMPUTER INVOLVEMENT** (Circle all that apply) Types of equipment with which you are personally involved either as a user, vendor, or consultant.
   - A. Mainframes/Superminis
   - B. Minicomputers/Small Business Computers
   - C. Microcomputers/Desktops
   - D. Communications Systems
   - E. Office Automation Systems
   - F. No Computer Involvement

E4840-5

Pass along readers, unite!

Demand your own copy of Computerworld.

YES, I want to receive my own copy of COMPUTERWORLD each week. I accept your offer of $44* per year — saving over 56% off the single copy price. In addition, as a subscriber, I understand I will receive bonus issues of COMPUTERWORLD FOCUS at no extra charge.

First Name MI Last Name

Title Company

Address

City State Zip

Address Shown: ☐ Home ☐ Business Single Copy Price: $2.00

* U.S. Only. Canada, Central America & South America $110/Europe $165. All countries $245 (Airmail). Foreign orders must be prepaid in U.S. dollars.

Please complete the information to the right to qualify for this special rate.

COMPUTERWORLD

1. BUSINESS/INDUSTRY (Circle one)
   - 10. Manufacturer (other than computer)
   - 20. Finance/Insurance/Real Estate
   - 30. Medicine/Law/Education
   - 40. Wholesale/Retail/Trade
   - 50. Business Service (except DP)
   - 60. Government — State/Federal/Local
   - 65. Communications Systems/Public Utilities/Transportation
   - 70. Mining/Construction/Petroleum/Refining/Agric
   - 80. Manufacturer of Computers, Computer-Related Systems or Peripherals
   - 85. Computer & DP Services, including Software/Service Bureau/Time Sharing/Consulting
   - 90. Computer/Peripheral Dealer/Distributor/Retailer
   - 75. User: Other _____
   - 95. Vendor: Other _____ (Please specify)
2. TITLE/FUNCTION (Circle one)
   - IS/MIS/DP MANAGEMENT
   - 19. Vice President, Asst. VP
   - 21. Dir., Mgr., Suprv., IS/MIS/DP Services
   - 22. Dir., Mgr., Suprv., of Operations, Planning, Adm. Services
   - 23. Dir., Mgr., Suprv., Analyst, of Systems
   - 31. Dir., Mgr., Suprv., of Programming
   - 32. Programmer, Methods Analyst
   - 35. Dir., Mgr., Suprv., OA/WP
   - 38. Data Comm. Network/Systems Mgt
   - OTHER COMPANY MANAGEMENT
   - 11. President, Owner/Partner, General Mgr
   - 12. Vice President/Asst. VP
   - 13. Treasurer, Controller, Financial Officer
   - 41. Engineering, Scientific, R&D, Tech. Mgt
   - 51. Sales/Mktg. Mgt
   - OTHER PROFESSIONALS
   - 60. Consulting Mgt
   - 70. Medical, Legal, Accounting Mgt
   - 80. Educators, Journalists, Librarians, Students
   - 90. Others _____ (Please specify)
3. COMPUTER INVOLVEMENT (Circle all that apply) Types of equipment with which you are personally involved either as a user, vendor, or consultant.
   - A. Mainframes/Superminis
   - B. Minicomputers/Small Business Computers
   - C. Microcomputers/Desktops
   - D. Communications Systems
   - E. Office Automation Systems
   - F. No Computer Involvement

E4840-5

NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

BUSINESS REPLY MAIL
FIRST CLASS PERMIT NO. 55 MARION, OH 43306

POSTAGE WILL BE PAID BY ADDRESSEE

COMPUTERWORLD

P.O. Box 2044
Marion, Ohio 43306-2144

NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

BUSINESS REPLY MAIL
FIRST CLASS PERMIT NO. 55 MARION, OH 43306

POSTAGE WILL BE PAID BY ADDRESSEE

COMPUTERWORLD

P.O. Box 2044
Marion, Ohio 43306-2144

When your top execs want sales, cost data — fast

Case study: Financial planning setup helps Lotus provide management with critical info

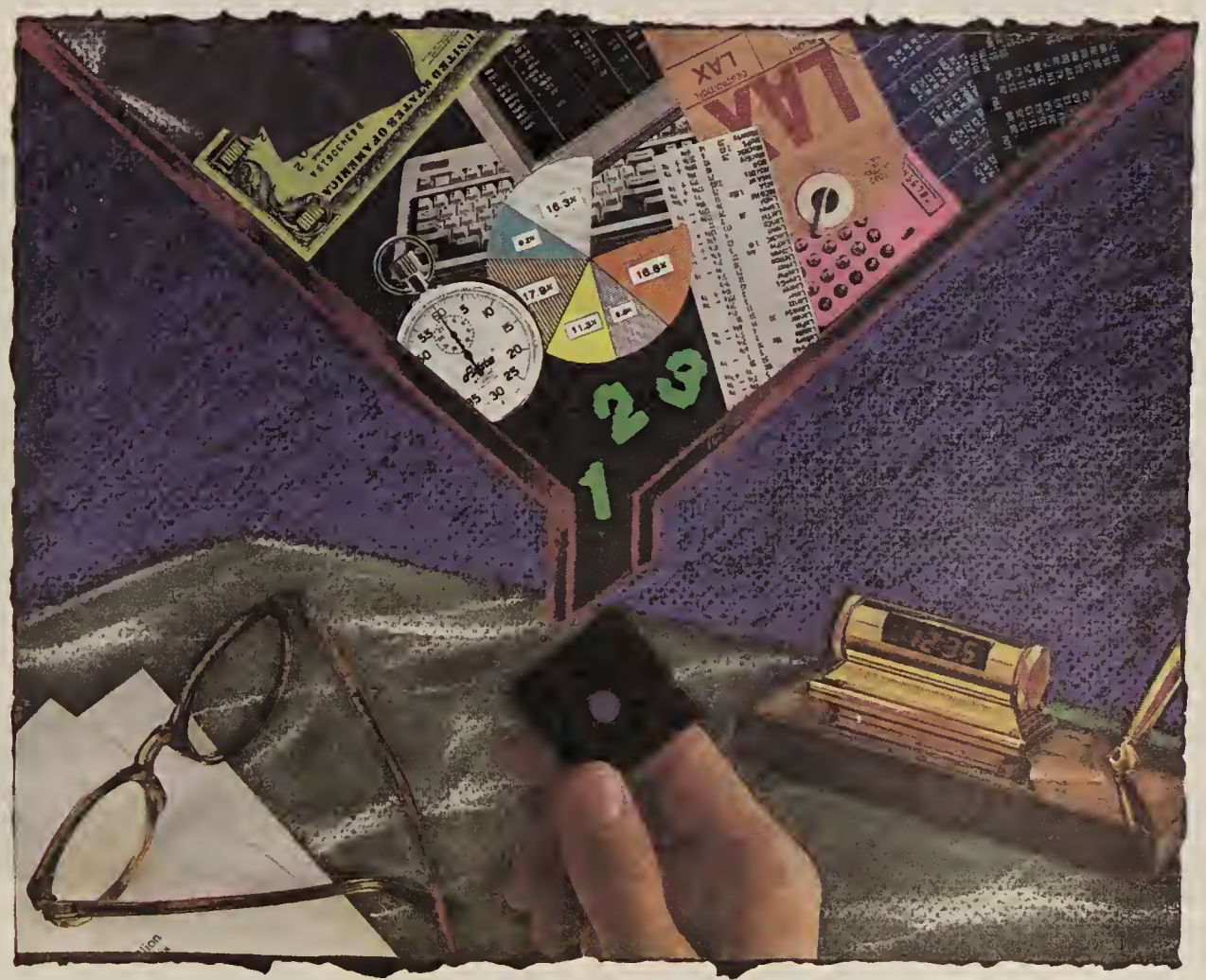
BY HARRY ANDERSEN

How can your company's top managers get the most valuable financial information from computer systems? It all depends on what information they want and how they want to access it.

When I joined Lotus Development Corp.'s finance group as controller in mid-1985, upper management had just begun to take a different view of financial controls. Until then, simply keeping up with the company's growth had been about as much as the finance group could handle. Revenue had jumped from $53 million in 1983 — the company's first full year of operation — to $225 million in 1985.

By 1986, though, growth was starting to settle down to an annual rate of 25% to 30%, and we had breathing space to concentrate more fully on financial planning. Soon we realized — possibly because we were unable to provide top management with information as quickly as we wanted to and they wanted it — that we needed to devise a new financial planning system.

Several additional issues brought the point home. For one, fast access to financial data on such business factors as sales, currency fluctuations and other cost drivers is crucial in a growing company. Yet the growth had also kept Lotus in a state of almost constant change. The company was going through at least one major reorganization a year as well as assimilating new organizations through acquisition, and we in finance couldn't respond fast enough.



JAMIE HOGAN

Andersen is corporate controller and chief accounting officer at Lotus Development Corp. For more than 16 years before joining Lotus, he held various management positions in finance and manufacturing at General Electric Co.

Starting from scratch

Why? Consider the situation in which the chief executive officer asked to see operating costs for the information services division, with comparisons with the previous year's costs, budget projections for the current year and forecasts for the next year. But three months before the CEO's request, information services had been reorganized, splitting off two groups and putting them in another part of the company.

To meet the CEO's request, we had to recast data from the previous year's totals to reflect the reorganization, as well as rework any budget projections made before the reorganization took place.

The difficulties with reorganizations point to yet another set of problems: the contradiction between the kinds of financial reports top management wants and those the accounting department needs to produce.

Top management wants an almost infinitely flexible way of looking at corporate performance — by product line, division or even geographical region when useful. But the corporation has to maintain precise historical information for government and shareholder reports — data that provides a clear and precise trail for audit purposes.

For the most part, the transaction-oriented ledger software

- **What they need, when they need it**
- **A flexible way of examining performance**
- **Eliminate marathon work weekends**

that most accounting departments use is ill equipped to generate the kinds of plans and forecasts that management needs to see.

The old days

Until the new system was set up, the way we produced monthly management reports was by taking data, mostly from the Digital Equipment Corp. Vaxcluster-based ledger, and manually keying it into Lotus' Symphony spreadsheets and then running the reports. The process took several people-days of effort and often fell on a weekend. It was a cumbersome task and frequently introduced errors. And whenever a reorganization took place, everything had to be changed by hand. Changes were penciled in on printouts, and then the whole thing had to be rekeyed manually.

There had to be a way to cut down the manual work, ensure accuracy and give us more flexibility. With help from Research & Planning, Inc., a management consulting firm in Cambridge, Mass., we decided to design and install a new system geared specifically to management reports, planning and analysis.

It would start with a database that could integrate information from the ledger and other company records and automatically feed it into redesigned spreadsheet-generated reports. The database would be easy to restructure, making even large-scale reorganizations relatively simple to handle.

We started creating the master database and integrating it with the ledger systems in early 1987 by customizing a VAX-based management information program Lotus already owned. Right away, this undertaking brought yet another problem to light. Until then, some financial information was not centralized but was maintained in other geographic locations. And since not everyone was using the same account structures, the figures weren't readily combined.

For example, our European divisions had devised their own structures for organizing operating expenses. They were different enough from ours at the home office to complicate the task of drawing up overall totals.

Indeed, before we could feed their data into our computer system, we had to translate some of it by hand to conform to our own structures. Then, when Lotus opened an operation in Puerto Rico and made a series of acquisitions, the situation got even more complex.

Creating the new database gave us an opportunity to eliminate these inconsistencies and keep information for the entire company in one central location.

The new database gets most of its numbers straight from other accounting systems. It structures the data differently, however, so we can generate financial reports automatically.

The database's fundamental building block is the cost center, a typical example of which might be the manager and six technicians who make up the quality assurance group for one of the company's software packages. Each cost center — and Lotus currently has about 400 — is listed separately rather than as part of a department or division.

Why bother with that level of detail? Because that's what gives the system its flexibility. If the CEO wants to see figures on the cost of hiring by product line, for instance, we can produce a report immediately because the expense data is broken down into such specific detail. If he also wants the figures by geographical region, that report is just as easy to produce.

Today our regular monthly management reports on operating expenses, profit and loss, sales and cost of sales are generated automatically. Now we can run the reports without having to enter any data by hand, and instead of taking three days to produce, they're complete just four hours after the ledger has been closed for the month. And we're still able to provide information to individual PCs, so companywide users can manipulate it for their own analysis.

> CREATING the new database gave Lotus an opportunity to eliminate inconsistencies and keep information for the entire company in one central location.

Reorganizations easier

The new system has kept reorganizations from causing headaches. Because each cost center is listed separately, it's a relatively easy task for the systems support person to rearrange the database structure. It's just a matter of updating the organizational array — moving a center from one division's section in the database to another.

Now, we can deal with a major reorganization in less than a day. And we're much better prepared to handle growth through acquisition by breaking the new division's numbers into cost centers and adding them to the database.

What this setup means to the finance group is far more than just a lighter work load. Our ability to support management is up 100%. We can respond to management needs and react to changes faster.

We're now able to answer management queries that we never could before because of practical reasons. In the past, if the CEO asked how much we had spent on travel the previous month, we'd have to pull out ledgers for each department and call Europe, Puerto Rico and the

Lighting the Way to Opportunity.

The Biggest COMDEX Ever!!!

This is it! The tenth anniversary of COMDEX. The biggest and best COMDEX ever! Exploding with more innovation, more technology, more business opportunity than ever before! COMDEX/Fall'88 will have it all—and more...

More Exhibitors, Products and Services!

Over 1600 companies including 300+ from outside the U.S. From the industry giants to the strong up and comers. These key suppliers will show you how their products and support programs can help you build a more profitable business.

The industry arena of technology. The launching pad for product introductions. You'll find image processing, presentation graphics, optical WORMs, LAN utilities—more products and services than ever before!

More First-Hand Information!

The highly acclaimed COMDEX Conference offers more vital profit-building information. From connectivity to graphics to import/export issues, you'll gain first hand knowledge from leading experts on the hot issues affecting the industry.

More Opportunity For You!

The computer industry has grown dramatically through the 1980s. And for ten years, COMDEX/Fall has remained the premier international computer distribution event.

Again, this year, COMDEX/Fall offers even more benefits than ever before—products, information and the techniques and know-how you need to succeed. All presented in a perfect business environment which you cannot afford to miss.

Get More For Your Business—Register Today!

Let COMDEX/Fall '88 light the way to new business opportunities for you. Hotels are filling up fast, so register NOW! Complete and return the coupon today for complete conference information, exhibitor lists, registration forms and big savings on hotels and travel connections from around the world.

Yes! I want COMDEX/Fall '88 to light the way to more business opportunities!

☐ Send me attendee and travel information
☐ Send me information on exhibiting

Name_____
Title_____
Company_____
Address_____
City_____ State_____ Zip_____
Telephone (_____)_____

CW920

Return to: COMDEX/Fall '88
300 First Avenue, Needham, MA 02194

COMDEX®/Fall '88
THE 10th ANNIVERSARY

November 14–18, 1988 • Las Vegas, Nevada

COMDEX/Fall '88 has been selected by the U.S. Department of Commerce to participate in the Foreign Buyer Program

Produced by THE INTERFACE GROUP, Inc.
World's Leading Independent Producer of Conferences and Expositions

©1988 The Interface Group, Inc.

West Coast. It would take a day, at least. Then, if he asked how much we spent a year ago, we'd have to repeat the entire process, and it would take just as long again. Now we can get the answer immediately, with no additional expense.

Questions like "What was the cost of sales for Product X?" used to be virtually impossible to answer because we didn't allocate costs such as scrap, distribution and obsolescence to individual products. Now, with the increased level of detail the new database stores, we can analyze gross margins for each product for the first time.

Don't forget the budget

The new system was also adaptable to the financial planning department's other main responsibility: preparing the annual budget and periodic forecasts. In this task, we have to consolidate models put together by top management with projections made by individual cost center managers — a process that often takes several tries to get a fit. It has always been an enormous effort, culminating in our staff's working 10- to 12-hour days through October and November. Last year, though, with the help of the new financial planning system, things were different.

We used to give cost center managers blank forms to fill in, which meant they had to dig through their own records for historical cost information, such as their advertising or outside services costs. Last year, instead of blank forms, we sent managers electronic mail transmissions containing their individual cost data, which we had put together from past costs and current trends using the new planning system database. They could then load this information onto their own PCs, eliminating both keying errors and the need to dig out their own records.

We were also able to reduce the amount of information we asked for. Managers used to be required to forecast costs in monthly increments. In 1987, we asked only for quarterly forecasts and let the computer interpolate the monthly figures.

When managers completed their forecasts, they sent the data electronically to the Vaxcluster, which consolidated it and loaded it directly onto our PCs. As a result, doing the 1988 budget took considerably less manpower than budgets had in the past, and it was easier. Now that we've made the transition, it should be even simpler in the future.

And the budget is also more accurate. Before we began using the minicomputer for financial planning, we did number crunching on several different PCs, which sometimes led to discrepancies. It was also difficult to make sure that changes to one part of the plan were reflected everywhere else. Many of our long hours were actually spent tracking down these problems — time we now have the luxury to spend on additional analysis.

Better analysis

And that leads to the most striking result of the changeover: the new level of analysis we're now able to perform. This year, we'll be able to compare the budget with actual costs in a more meaningful way than was possible before, since we'll be able to recast our figures to reflect reorganizations.

We'll also be able to look at details with far more flexibility — for example, we can look at a single expense item for the entire company or at a group of items within one division. And since for the past few years we have ended up completely redoing the budget for the last two quarters, we now have a better way to complete that task.

> WITH THE new system, Lotus is now better able to provide up-to-the-minute financial information to members of top management — when they want it and how they want it.

The new financial planning software does require additional staff to keep it operating. Last year, we had a consultant from Research & Planning developing the programs. On a permanent basis, we're bringing on two people: one with a finance background to be the administrator and one with a systems background to keep the database and other software up to date.

However, future manpower savings should more than compensate for these additions. With the system in place, our department should be able to accommodate considerable company growth without having to add any more financial planning staff members.

Why has the new financial planning system been so successful? First, Lotus is a technology company with computer-literate managers. There were many PCs already installed throughout the company, which we were able to leverage as a resource for our project. In addition, the company has worldwide, compatible electronic mail capability, which we used to eliminate keying data by hand. And, finally, the company had the resources that gave us the elbow room to try new solutions.

With the new system, we are now better able to provide up-to-the-minute financial information to members of top management — when they want it and how they want it. •

Why We're Betting a Million Lines of Code on the SAS/C™ Compiler.

At SAS Institute Inc., we've invested more than 10 years of résearch—and over a million lines of code—in the SAS® System, the world's leading data analysis software. So you can bet we left nothing to chance when we chose the C language for the next generation of our software.

We selected C for the portability it would bring to the SAS System, but weren't about to risk our code on just **any** mainframe C compiler. So we tried them all. When none could meet our exacting requirements, we created our own: the SAS/C compiler.

We Developed It.

Support It. Use It.

The SAS/C compiler set new standards for efficiency and technical quality, with:
- A source-level debugger that includes structure display, ABEND recovery, and debugger I/O exits for debugging specialized applications
- Reentrant object code
- Highly optimized generated code
- Use of standard IBM linkage conventions, with support for 31-bit addressing
- A CMS Rexx/TSO CLIST interface
- Support for signal handling including program checks and terminal interrupts, and non-standard signals such as timer interrupts and stack overflow
- Many built-in functions including string handling
- In-line assembler.

SAS is a registered trademark of SAS Institute Inc., Cary, NC, USA. SAS/C is a trademark of SAS Institute.

Copyright © 1987 by SAS Institute Inc.
Printed in the U.S.A.

And when we combined these features with outstanding technical support and frequent updates—both provided free—software developers everywhere took notice. The SAS/C compiler is now the market leader, installed in hundreds of commercial firms and academic institutions.

Test It. Compare It.

FREE for 30 Days.

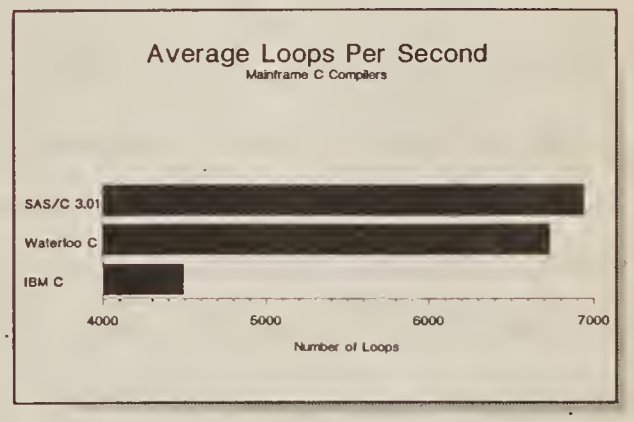
We're betting you've set the same high standards. That's why we'd like to send you the SAS/C compiler, under OS or CMS, for a free 30-day evaluation. We'll also send you a free copy of a leading benchmark program. Compare our compiler with any other. Odds are, you'll choose the SAS/C compiler.

Just mail the coupon below. Or call your Software Sales Representative at (919) 467-8000.

SAS®

SAS Institute Inc.
SAS Circle ☐ Box 8000
Cary, NC 27512-8000
Phone (919) 467-8000
Fax (919) 469-3737

Using a C version of the Dhrystone benchmark, the latest SAS/C compiler release produces the fastest code among the top 3 mainframe compilers. It even tops our own previous release by 35%.



I'd like to put the SAS/C™ compiler to the test with a free 30-day trial, and my free copy of the Dhrystone benchmark program. Give me the details.

Please complete, or attach your business card.

Name _____ Title _____
Company _____
Address _____
City _____ State _____ ZIP _____
Telephone _____ CW03OCT88

Mail to: SAS Institute Inc., Attn: CC, SAS Circle, Box 8000, Cary, NC, USA, 27512-8000

France...The Channel waters are black with shipping, as reinforcements and supplies are funnelled ashore for the conquest of the Cherbourg Peninsula. (Credit: Bettmann)

New DADS/Plus.™

Dynamic CICS Resource Management, On-line, On Time.

Down time.

Even the words sound depressing.

And calling it unscheduled maintenance—or scheduled maintenance for that matter—doesn't make it sound much better.

Now you can just about eliminate planned down time from your DP vocabulary, because DADS/Plus lets you dynamically control your CICS environment—without stopping CICS.

So you can add or remove load libraries. Or modify the search order of these libraries.

You can choose which library a module will be retrieved from.

And rename or delete a module.

You can add FCT and DCT table entries, allocate and deallocate files and databases, effectively maintain multiple regions—and painlessly migrate new applications into production.

And you can do it all faster than ever—because DADS/Plus gives you a new level of control. Best of all, you can accomplish your CICS maintenance at your pace, to your schedule. While everything else is up and running.

To find out more about DADS/Plus, call us at 800-642-0177 today. In Canada, call 201-592-0009.

DADS/Plus

On-Line Software INTERNATIONAL

Authorities in IBM® Software

IBM is a registered trademark of International Business Machines.

Passed up

FROM PAGE 1

Yet, by any definition, the PDT was a PC. It coupled a computer terminal with built-in intelligence to a CRT screen and keyboard. It operated independently of a minicomputer or mainframe.

Bricklin decided that this computer would be the right one on which to build his electronic spreadsheet. He contacted the local DEC sales representative, who gave him product literature but no other attention. DEC dealt almost exclusively with corporate or scientific accounts. Confronted with a single interested party — and a student to boot — the salesman didn't find Bricklin worth pursuing.

Olsen displays *DEC's new PC line in 1982*

Meanwhile, at Harvard, Bricklin borrowed an Apple Computer, Inc. Apple II from fellow student Dan Fylstra to develop his idea into software. Bricklin called it Visicalc, short for visible calculator. He and partner Bob Frankston, along with Fylstra, published the software and wrote their names in computing history.

PCs find something to do

With the advent of the electronic spreadsheet, PCs suddenly found something important to do. Armed with Visicalc, the Apple II's sales took off, and the PC industry was created.

At DEC, the opportunity to ride Visicalc into the PC market passed without much attention. "DEC didn't do anything wrong," Bricklin says. "The salesman just wasn't very aggressive. I could have written Visicalc on the PDT, though." Bricklin's experience symbolizes DEC's history in PCs — a series of opportunities missed and wrong roads taken.

By 1980, DEC could no longer ignore the rising interest in these personal machines. There were more than a dozen PCs, generally called smart or intelligent terminals, in various stages of development in the multitude of DEC's product groups.

The product-line structure, which had worked so well to this point, was now becoming a tar pit, slowing down and smothering new ideas. The PDT that Knowles was trying to develop was talked to death, according to Gordon Bell, then DEC's chief engineer. The product-line managers, who all had their own versions of PCs brewing, coveted that product space and wouldn't let Knowles sell it. "We spent countless hours deciding who could sell and get credit for it," Bell says. "Ken tried to get consensus in a world where that wasn't possible. It required a painful decision."

The product-line teams that were well-funded, like the terminals group, engineered their own machines. Others contracted with Bell's central engineering to build them. Bell was galled by the situation. He felt that his group was being forced to "act like whores," building anything anybody wanted as long as they paid for it. He sent a memo to Olsen, listing the various conflicting machines in development. He stressed the negative results of engineering being at the beck and call of the product lines. To Bell, this arrangement was a surefire disaster. He proposed a "golden rule" whereby engineering would have as much input into a computer as the product line.

Olsen responded swiftly. He sent a memo to the Group Vice-Presidents committee, one of DEC's myriad management groups, saying: "I have long been dismayed as to why so many of our product-line products have been poor, and why it has been so hard to pin down responsibility for them. I think I now understand the problem, and I'll leave it with you and your committee to, with all haste, find the solution."

Despite Olsen's call for a solution, the problem didn't get resolved. And the PC itself was the main reason why. The enormous potential of these low-priced machines dazzled DEC's young engineers. It was a matter of corporate pride to them that DEC be on the leading edge of this new wave. Didn't DEC, after all, pioneer the concept of interactive computing, the very basis for PCs? Wouldn't a desktop machine for the individual be the culmination of Olsen's dream?

The answer, as the 1980s began, seemed to be a definitive "no." Throughout the '70s, Olsen insisted that personal computing was a concept that had no basis in need or reality. To one proposal to build a PC-like device that came before the Operations Committee in 1974, Olsen responded, "Why would anyone need a computer of their own?"

Olsen seemed to be caught on the terms: In his mind, a PC equaled a home computer. In the business market, DEC already offered power to the desktop with its VT100 terminals hooked into PDP-11s and VAXs.

Olsen's stubborn view — "The personal computer will fall flat on its face in business" — was, according to Ries and Trout's *Marketing Warfare*, "perhaps the biggest misjudgment in American business history since Henry Ford's failure to block General Motors Corp.'s high-end flank. Ken Olsen is a computer genius, but even a genius can be wrong. As Fiorello LaGuardia once said, 'I don't make many mistakes, but when I make one, it's a beaut.' "

Olsen's views on PCs changed abruptly in 1980. Bell pinpoints the catalyst of this change as an interview with a young female reporter from *Business Week*. She came armed with inside information about DEC's low-end efforts and questioned Olsen intensely about the company's lack of progress. "It challenged his manhood," says Bell. "Suddenly, we had to win in PCs."

Others believe that Olsen hesitated because he was seeking a champion for the PC, someone he could count on to make it happen his way. That person just didn't emerge. So Olsen took on the task himself.

"Once he made the switch and said we were going to do it, then [to Ken] nobody could beat us," observes Ted Johnson, then head of sales. Olsen would later say that he was swayed into making "commodity computers" by the critics and DEC executives. Whatever the source of his motivation, he suddenly talked constantly about products a common person could use, easy enough for secretaries or even a minister at his Park Street church. His vision became known internally as "computers for clerks and clerics."

DEC's advertisement *for the PDT-11*

Finally fed up with the low-end confusion, Olsen decided that DEC should start from scratch to draw up a PC strategy. And he picked a young engineer named Avram Miller to do it.

Miller was called before DEC's operations committee, and he made his pitch. It was actually Olsen's vision, so he knew he was carrying a great deal of leverage. What he proposed eventually became the DEC Professional PC. The committee approved Miller and his plan. But he sensed even as he was leaving the room that most of the people in there thought he would fail and that perhaps a few hoped he would.

Miller immediately dubbed the project "KO." In memos it stood for Knock Out or Kick Off. But Miller's intention was clear: He wanted everyone to know that this was Ken Olsen's project. And indeed it was.

With a budget of $20 million, an unheard-of sum for a low-end project, Miller carried carte blanche at DEC. Bell sent out a memo on Aug. 28, 1980, detailing the proposed project and its implications.

"Ken would like to do this project in nine months," Bell wrote. "We will need maximum support from each group." Bell called the machine "an applications terminal and small system." He never used the words "personal computer." On the list of people involved, he noted that Avram Miller was driving the overall project, and the packaging architect was Ken Olsen.

Three-headed monster

In August 1981, IBM introduced its Personal Computer to the world. Philip "Don" Estridge had convinced IBM's hierarchy to let him go off to Boca Raton, Fla., and quickly build a PC to hold off Apple and the other contenders threatening to swallow this new market. IBM couldn't allow another market takeover to occur as it had in the mid-1960s when DEC quietly created — and then went on to dominate — the minicomputer business.

Upon its introduction, Miller immediately bought an IBM PC so he could examine firsthand what he was competing against. He took it into his office and called Ken to come and take a look. Olsen was excited. This was the first IBM PC brought into DEC. Together, with screwdrivers, they took the competition apart.

After seeing the inside of IBM's computer, Olsen looked at Miller and laughed, "If you ever built me something like this, you wouldn't be here anymore." Evaluating the machine as an engineer, Olsen saw junk — the inelegant engineering of a quickly constructed machine. If this was the best

Behind the story

In 1980, Ken Olsen was approached by one of DEC's most unlikely customers, Apple.

Michael Scott, Apple's president at the time, visited Olsen to discuss whether Apple should order more PDP-11s or switch to the VAX for billing and order entry. The meeting was cordial, but Olsen couldn't hide his feeling that Apple was going to fail as a personal computer supplier.

Scott ordered a second PDP-11, which Apple needed immediately to process orders because the first one was running out of capacity. But months went by and the machine didn't arrive in Cupertino.

Desperate to get some action from DEC, Scott sent Olsen a 6-foot-high white-rose funeral wreath, with a rest-in-peace ribbon striped across the front. The accompanying note from Scott said: "This is what I think of DEC's delivery commitments." Apple's message was: "You are killing us with this endless delay."

A PDP-11 was on a plane the next day with two DEC technicians on board to install it. But the machine flew out of the Mill untested. When turned on in Apple's computer room, the PDP-11 caught fire. Eventually, the machine was set right, and Apple remained a DEC customer.

Out of the episode, a legend emerged. It was Apple's brash founder, Steve Jobs, not Scott, who visted Olsen's Mill office, the story went. He put his boots up on Olsen's desk and told Ken that he was going to blow DEC out of the water in PCs. He supposedly followed this arrogant display with a black funeral wreath sent to mock DEC's performance in PCs.

Despite this colorful legend, Olsen and Jobs — two men representing widely different generations and computing philosophies — never met at the Mill.

GLENN RIFKIN
and GEORGE HARRAR

IBM could offer, he thought, DEC would sweep the market.

Olsen was misjudging how and why PCs would be bought. His reaction sprang from the core of his beliefs about how computers should be built and used. It was fundamentally not within his psyche to accept something less than top quality. There was no point in creating a machine if you didn't make it the best possible way, with care and insight and elegance.

Olsen's conviction flowed down through DEC to every layer of the organization. It was at the heart of "do the right thing" — which was a founding tenet of DEC. Every employee understood this drive for perfection if they understood DEC at all.

But Olsen didn't understand the crucial part software would play in PCs. In his view, the most important thing a computer company could deliver was well-engineered hardware. He paid so little attention to software that some inside DEC said that he expected it to come from heaven.

Early on in the KO project's life, Miller met with Olsen frequently, often spending half-days discussing design and direction of the new machine with him. Miller began to understand the essence of Olsen behind the ambiguities. "When you were with Ken, you knew you were with somebody," Miller says. "He has this uncanny ability to get people to really want to do what he wants to make him happy."

Olsen talked quietly, but mostly he listened to Miller. Miller often walked away not knowing what Olsen was alluding to in some of his offhand comments and parables. "He would have been much more effective if anybody could have figured out what he wanted," Miller says. "I'm not sure he knew what he wanted."

In fact, Olsen very definitely knew what he wanted in the design of the KO. The clunky, uninspired boxes other PC-makers were turning out would never fly at DEC. Olsen foresaw sleek, stylized components that would enhance, rather than detract from, a work environment.

While Miller assembled his core team, Olsen dove into designing the monitor. He pushed for a wedge shape, which was, from an industrial design standpoint, a breakthrough. Packaging the necessary circuitry into the small, odd-shaped device was difficult. The quest was predicated on the belief that the monitor

Dan Bricklin

and keyboard should complement the desk top rather than conflict with it.

Olsen questioned his designer closely: Should there be a handle on the bottom? How would the machine sit on the desk? How could glare on the screen be minimized? He frequently used the word "elegant" to describe what he was after.

Olsen argued that a light filter should be built over the screen. The designers said that a filter was too susceptible to fingerprints. Against their recommendations, Olsen specified that filters should be included. And he advised that a spray can of window cleaner be shipped with each system. "They can wipe away the fingerprints, but they can't wipe away the glare," he said. And so, DEC shipped window cleaner with each personal computer.

Mixed blessing

Olsen's involvement in the project was a mixed blessing for Miller. The stamp of approval afforded him more freedom and influence than someone so new to the company — he joined DEC in 1979 — would ever have achieved so quickly. But it also created agonizing delays and costly retrofits caused by Olsen's unbending views on packaging.

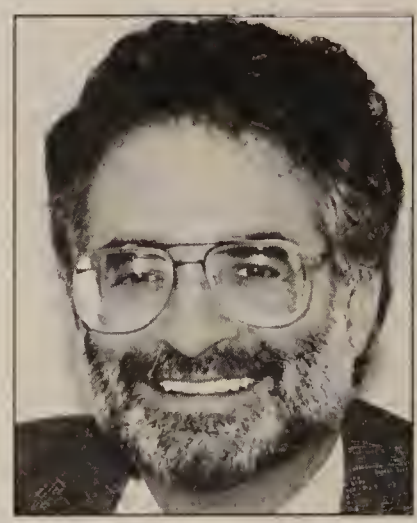
Olsen rarely stated what he did or did not want done. Miller found out that Olsen was displeased with the initial monitor design through engineer Dick Gonzales, who was prototyping a different one. Miller had already spent months and hundreds of thousands of dollars on the first monitor, and this change of direction upset him. But he was also a realist. "I knew I was going to end up building his monitor," Miller says.

Despite his mandate, Miller ran into resistance from various quarters. There was no consensus on how the low end should be structured organizationally or strategically. Even though Miller was operating with Operations Committee approval, the low end remained volatile — unexplored territory in DEC's convoluted matrix organization. Unlike the existing product lines, the KO project was an illegitimate child, which had sprung up quickly, without roots in any other machine and with an enormous amount of funding — all ingredients for attracting envy and jealousy in DEC's structure.

Miller could see that getting consensus on how to proceed would be impossible. There were too many competing voices advising how sophisticated the machine should be, what ports it should have, how it should look, how it should be sold. So he and his fledgling group set their own course. At DEC, where open debate was presumed, Miller committed heresy.

DEC now controlled 38% of the minicomputer business; it would soon own an equal amount of the personal computer business, Miller predicted, a market that would reach $5 billion in a few short years. "We have to be No. 1," he told his people. "If you are not No. 1, you can't control things, and that's no fun."

When IBM announced its machine, shock waves rocked DEC. How could IBM have developed the machine so quickly? Except for the Winchester hard disk drive and the line cord, DEC designed and built every piece of its machine. DEC tooled the sheet metal and plastics for all the components, manufactured the floppy disks, developed the microprocessor. Under the con-



straint to "build it here," it was a minor miracle that the machine came to market as fast as it did — in 18 months.

Under Estridge's guidance, IBM sourced out 80% of its PC. IBM bought the operating system, MS-DOS, from a then-small software company in Bellevue, Wash., called Microsoft Corp. IBM turned to a host of third-party suppliers and the Far East for disk drives, monitors and add-in boards. IBM assembled the purchased pieces in nine months — the same timetable Olsen had originally demanded. IBM's PC and DEC's Pro would have hit the market at the same time.

In retrospect, Miller believes that DEC's best strategy would have been to do what IBM did — get a product out quickly, build market acceptance and then plunge ahead with a higher quality follow-on. But now it was too late for second-guessing. IBM was out to market first; DEC was playing catch-up.

Miller pressed on. KO — renamed CT, for Computer Terminal — would go far beyond the IBM PC's capabilities. IBM's personal computer was designed

> "HE WOULD have been much more effective if anybody could have figured out what he wanted. I'm not sure he knew what he wanted."
>
> AVRAM MILLER
> *On Ken Olsen*

to be just that — personal, a stand-alone device for the individual. DEC was building a machine to network to other DEC systems. It included features that, in hindsight, were years ahead of the competition, such as a high-resolution bit-mapped display and a multitasking operating system. It had a proprietary operating system based on the PDP-11, which allowed it to hook cleanly into networks of DEC computers.

Meanwhile, Olsen found a champion for a smaller version PC that he wanted. In June 1980, a talented and aggressive young Southerner named Barry James Folsom had joined DEC as senior engineering manager of the Terminal Products Group in Marlboro, Mass. In late 1981, Folsom started designing the smaller, less complex machine at

Announcing Fall Courses

Featuring IMS, DB2/SQL, CICS, FOCUS,* VSAM and CASE

DP Education

DBMI offers **hands-on** training in our scheduled DB2 and SQL classes — *SQL Application Programming and Design, DB2 Data Base Design and Administration* and *QMF*. Students in these classes can spend 2-3 hours per day in hands-on workshops.

Locations

Washington, D.C. | New York City | Hartford
San Francisco | Chicago | Dallas
Los Angeles | Atlanta | Boston

Send for free 1988 Fall Schedule of Public Seminars or call (203) 646-3264 for immediate information.

We make every bit count.

DBMI®

Data Base Management, Inc. An ams Company
1075 Tolland Turnpike
Manchester, CT 06040 (203) 646-3264

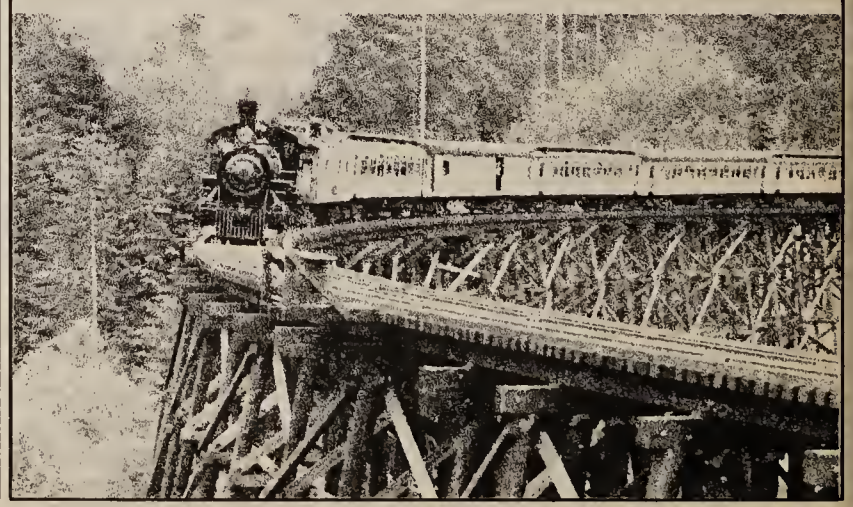
*FOCUS is a trademark of Information Builders, Inc.

Looking for computer training services?

MARKETPLACE puts you on the right track.

COMPUTERWORLD
MARKETPLACE

Shop for the products and services you need. Every week.



the request of Olsen and Bell. It was simply an insurance policy against IBM because besides CP/M, an early and popular PC operating system, it could run MS-DOS, the same operating system IBM had chosen for its PC.

While Miller was marshaling the company's resources on the CT project and Folsom was designing his "Rainbow" on a shoestring budget, another young DEC engineer, Dick Loveland, began developing the follow-on to the Decmate in the word processing group.

Miller didn't even learn of the two other low-end projects until well after they were launched. He had thought he was carrying the company's banner in the personal computer battle. Suddenly, he had unwanted company in the field.

Barry James Folsom

This situation was not unusual. Olsen often set up competing product-development groups, believing, as he said, that "competition vastly improves a product. History keeps proving that when we allow healthy competition, we get better products."

But to Miller, this competition was not healthy. He and Folsom butted heads, arguing over the merits of their approaches and fighting for resources both internally and outside DEC, sometimes going so far as to undermine each other's efforts in the crucial software development community. The word spread outside DEC to third-party developers — the Miller and Folsom groups each were claiming to have the company resources behind them.

Folsom and Loveland were riding the coattails of Miller's CT, using all the essential packaging and manufacturing models that he had paid for and sweated over. Olsen still considered the CT DEC's personal computer; the other two were backup machines, "just in case."

Miller complained about sharing resources. "It was a total disaster," he says. "Nothing worse could have happened. We managed to split all the engineering activities, all the third-party software activities, manufacturing, everything. I ended up without any word processing software, for instance. I couldn't go outside to get it, and I couldn't get the DEC group to do it because they were busy doing it for Decmate."

Conversely, Folsom found out that he couldn't get Visicalc, by now a best-selling software program, written for the Rainbow because, he believes, Miller told Visicorp that the Rainbow was an underfunded, unapproved machine that would likely not see the light of day.

Even the product's name ran into trouble. The Operations Committee actually wanted to call Folsom's machine CP/M, after its primary operating system. Folsom vehemently argued against that name. He called his friend, Bill Gates, the wunderkind chairman of Microsoft, and asked him to speak in behalf of his operating system — MS-DOS.

Gates met with Olsen at the Mill, DEC's Maynard, Mass., headquarters, in late 1981 and convinced him that CP/M had not wrapped up the PC market. MS-DOS, Gates insisted, might well become the industry standard, since IBM was embracing it. Olsen accepted Gates' argument and crossed CP/M off the list of possible names. That move saved DEC the enormous embarrassment of tying its PC to an operating system that would soon become extinct.

By early 1982, time was running short. The new target date to introduce the personal computers was set for May, just in time to make a splashy market entrance at the huge National Computer Conference in June. The development teams for all three computers were working at a crushing pace — seven days a week for months on end. As the announcement approached, Miller called in a corporate psychiatrist to help his tense group cope with the stress. "I've been here almost 18 full minutes listening to you," the psychiatrist said, "and I'm exhausted."

Andy Knowles, who could see the chaos of the low end that he was responsible for, tried to coordinate the impending introductions of the three new machines. At Saturday meetings, he gathered the principal managers involved to sort out the marketing efforts.

Miller hoped someone like Knowles could stop what seemed to be inevitable. But a meeting with Ken sealed their fate. Olsen called in Miller, Folsom and Loveland to discuss the three-headed monster — DEC's low-end strategy. He said, "You know, I'd make it easy on everybody if I said just one of these products will come out. But I'm not going to do it, because they do different things, and the market will figure out who is right."

"The market figured out who was right," Miller says, "and it was IBM." •

OLSEN OFTEN set up competing product-development groups, believing, as he said, that "competition vastly improves a product. History keeps proving that when we allow healthy competition, we get better products."

Copyright © 1988 by Glenn Rifkin and George Harrar from *The Ultimate Entrepreneur*, published by Contemporary Books, Inc.

Running out of time to shop for ...

- Used Equipment
- Software
- Rental & Leasing
- Supplies
- Financial/Business Services
- Hardware
- Communications Equipment
- Time & Services
- Bids & Proposals
- Training Services
- Real Estate

. . . Find what you're looking for in MARKETPLACE and save valuable time!

COMPUTERWORLD
MARKETPLACE

Shop for the products and services you need. Every week.

HALF A MILLION REASONS TO CALL MICOM FOR YOUR LOCAL NETWORKING NEEDS

Thousands of businesses use more than half a million MICOM local multiplexors, data sets, line drivers and leased-line modems to support their networking needs.

Because MICOM sets price/performance standards.

Because MICOM builds 15 years of manufacturing expertise into every product.

Because MICOM distributors provide immediate delivery.

To learn who your authorized distributor is or more about MICOM local data distribution solutions

Synchronous Modems
Data over Voice
Local & T1 Local Muxes
Point-to-Point, Multipoint & Terminal-Powered Line Drivers

CALL 1 (800) MICOM U.S.
642-6687

Still screaming about why CICS failed?

Get the answer faster than you can print a system dump.

Eyewitness™ gives you **online diagnostics** instantly, so you can debug storage violations, CICS system abends, and operator cancels—fast. It even slashes dump time and downtime by up to 90%! There's no other product like it.

In just two months, Eyewitness helped over 75 data centers solve their CICS mysteries. Imagine...No more waiting for the dump to print. No more reams of paper. No more agonizing hours searching hex code for clues. And now, if you need level 2, you'll know it! Best of all, Eyewitness bears the signature of Landmark Systems Corporation, makers of The Monitor for CICS.™

Eyewitness is revolutionary! See for yourself. Call us today for a FREE, 30-DAY TRIAL at **1-800-227-8911** or 1-703-893-9046—and scream no more.

LANDMARK™

eyewitness™

SOLVE THE MYSTERY

Landmark Systems Corporation
8000 Towers Crescent Drive, Vienna, Virginia 22180-2700

TAKING CHARGE

William R. Brittain

Getting organized

One of the most obvious ways to improve productivity is simply to get organized. There's nothing new about that idea, but even the obvious is often overlooked or put off.

We tend to organize, some people more than others, because there are advantages to it; in business, it often makes a competitive difference. In programming, there is a real, informal system of organization that experienced programmers use to their advantage. By adding some thought and design, we can improve programmer productivity based on this common approach.

In nearly all the minicomputer and mainframe shops I've seen, the technical environment is the last to be given organizational consideration. Programmers aren't organizers, and the people who are supposed to be organizing, such as analysts and managers, are unaware of the real working environment of programmers. It is a world closed to the attention of those who might passionately organize every detail of a policy or business meeting but lack the technical background to understand or care.

Time for a change

The result is a programming environment that is the same as it was 20 years ago — which does not mean it was terrific at that time. Rather, it survived because it gave rise to an informal system of organization.

Continued on page 105

PCs smooth disabled workers' road to MIS

BY JAMES DALY
CW STAFF

The glossy information packet issued by Handisoft, a Philadelphia-based programming firm, breezily describes some of its services: analysis of business problems, the design of software to meet those needs, training seminars and troubleshooting.

But tucked into a nondescript paragraph is a phrase that distinguishes Handisoft from the thousands of other companies trying to make a buck: "a unique team of professional programmers who are physically disabled."

There is no altruistic pitch or be-kind-to-the-handicapped sympathy angle. Except for these few syllables, there is nothing in Handisoft's brochures to indicate that its 20 full- and part-time staffers tote a different set of emotional and physical baggage than most MIS workers. Which is exactly the way Handisoft likes it.

Over the past five years, machines that talk, listen, teach, communicate and translate have rapidly cleared major workplace hurdles facing the disabled. In a surprising example of reciprocity, a generation of handicapped workers has returned the favor and flocked to the ranks of the information systems world.

The widespread availability of the personal computer almost single-handedly delivered the disabled from the Dark Ages. Suddenly, a person having only the control of an eyelid or a toe could communicate with virtually anyone with the appropriate equipment attached to a machine.

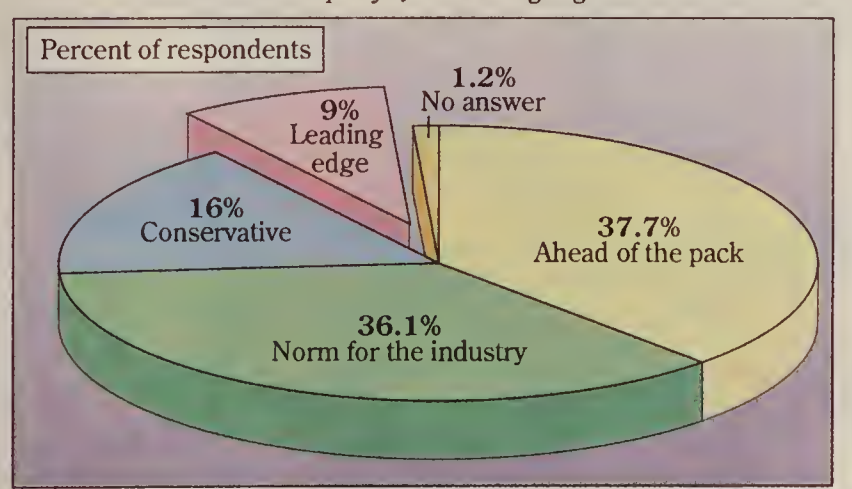
PCs were easy to use, patient and nonjudgmental, handicapped workers say. They still could not right nature's wrongs, but they suddenly threw open doors that had long been locked.

Continued on page 108

Data View

How does your company approach computing?

Only a small portion of 244 firms surveyed consider themselves exemplary of the leading edge



SOURCE: HUBBARD RESEARCH
CW CHART

Eyes front, and back

Aetna MIS chief resolves to learn from history

BY JAMES DALY
CW STAFF

While most MIS officers like to envision themselves as always looking toward the future, Bob St. Germain knows it is just as important to check over your shoulder now and again.

"As information systems professionals, we're haunted by our past," says St. Germain, vice-president of information systems operations at Aetna Life & Casualty Co. in Hartford, Conn. "We're known for providing things that are too big, too late and no longer do what needs to be done."

And it's a trap he intends never to fall into. He vows never to perceive himself as the wizard in the glass cage; he's been in the trenches too long.

"We can't exist with blinders," St. Germain says. "We need to keep our eyes open to improve our perspective and learn everything we can about our business. Because, after all, information processing is just a tool to support the business." Serious business talk from a man who, were it not for a few misplaced germs, might be factoring square roots for a living.

Perspective

While working toward a master's degree in mathematics at the University of New Hampshire, St. Germain contracted mononucleosis. During his recuperation, he got married. Suddenly, earning a wage seemed a lot more important than attaining an additional degree.

St. Germain began scanning the want ads in *The Hartford Courant*. An advertisement placed by Aetna that mentioned computers caught his eye. "My idea of computers at the time was the punch cards that came with the telephone bill, and I thought that sounded neat," he says 17 years later.

Although the career began almost as a fluke, he found it enjoyable. He started as a programmer trainee and scaled the corporate ladder.

Today, St. Germain reigns as Aetna's chief of telecommunications, commanding a budget of $98 million. At his post at the company's headquarters in downtown Hartford, he is never more than a half-hour's drive from the 480 telecommunications department employees who staff a ring of offices in the nearby towns of Windsor and Middletown.

To maximize efficiency and minimize confusion and overlapping, St. Germain has sliced his department into several divisions. Each has a simple mission:

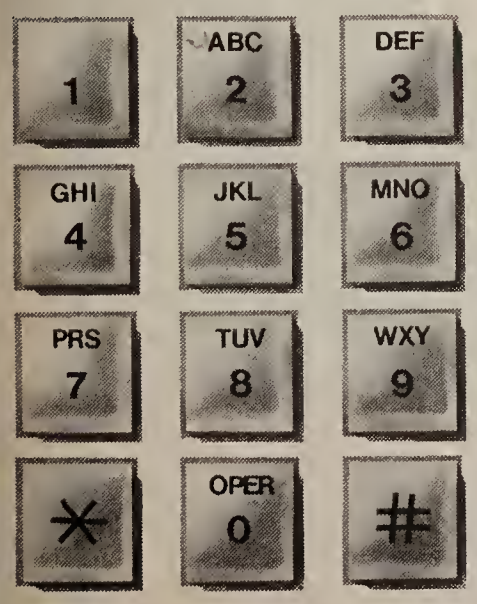
Continued on page 104

PROFILE

Bob St. Germain

Position: *Vice-president of information systems operations, Aetna Life & Casualty Co.*

Philosophy: *"We need to keep our eyes open to improve our perspective and learn everything we can about our business."*



TO GET THE MOST OUT OF YOUR WANG SYSTEM, USE THIS KEYBOARD.

Go ahead. Press 1-800-456-WANG. When you do, you'll begin to understand how you can get more out of Wang Systems. That's the number you call to register for the Technetron Conference. The conference is sponsored by the International Society of Wang Users and is being held at the John B. Hynes Convention Center in Boston from November 6 through 9.

The Technetron Conference offers a variety of seminars, as well as over 100 software vendor exhibits which will provide you with the knowledge you need to stay on top of technology and ahead of the competition. You'll learn how to make the most of Wang's products and how to best use them to manage change and innovation in the future.

To reserve your place at the Technetron Conference, simply use your keyboard to call 1-800-456-WANG.

1-800-456-WANG

© 1988 Wang Laboratories, Inc.

CONNECTIVITY
HOST
MULTI
PLUG COMPATIBILITY
PERSONAL COMPUTERS
MULTI SESSION
MULTI SESSION
MULTI SESSION
MULTI SESSION
HOST
MULTI
ASYNC PROCESSORS
COMPUTERS
SYSTEM
INFORMATION SYSTEMS NETWORK
SYSTEM
ASYNC PROCESSORS
COMPUTERS
LOCAL CHANNEL
ASYNC TERMINALS
LOCAL CHANNEL
REMOTE CONNECTIVITY
605
615
620
630
REMOTE CONNECTIVITY
ASYNC DISPLAYS
DORET

The 6500 Multifunction Communication System from AT&T

If your 3270 system can make the right connections, you win. If not, you lose. Only it's not a game.

6500 SYSTEM DISPLAY

If your 3270 workgroups aren't getting the highest level of flexible functionality, you should be talking to AT&T about the 6500 Multifunction Communication System.

Your 3270-compatible system should be *solving* communications problems–not creating them. Today's corporate workgroups are diverse and complicated: mixes of mainframes, minicomputers, and other remote and local hosts coexist with scores of PCs and terminals spread around the company. The people who use them need to send and receive data with maximum efficiency. And you need assurance that your 3270 buy decisions are sound, long-term investments.

New pieces in the puzzle can create plug compatibility headaches and cabling problems. Users can end up with two terminals on their desks because system components don't talk to one another, and there's often no way to "cut and paste" crucial data among applications.

There's only one way to protect yourself: keep up with today's demands on your 3270-compatible system while you invest in a trouble-free future.

6572 PRINTER

Protect your investment while preparing for the future.

The AT&T 6500 Multifunction Communication System does for data communications what a PBX does for voice: it helps you move closer to creating a single, highly productive data network that lets your equipment – and your company's workgroups – run at peak efficiency.

With the AT&T 6500 System you can instantly transfer data between windows, thereby transferring data between sessions or hosts. By eliminating the communications "Tower of Babel," the 6500 System lets users concentrate on the tasks that really matter.

Here's what the 6500 Multifunction Communication System gives you *right now*:

- IBM[1]3270 plug compatibility.
- Functionality that includes: SNA/SDLC, 3270 BSC; Netview compatible, Protocol Conversion, X.25, Async access and others.

6500 SYSTEM DISPLAY

- As many as three simultaneous connections to synchronous host computers (one local and two remote, or three remote) with no changes to the applications software on the host. And all on one controller.
- Ability to add up to 32 synchronous devices, including PCs, displays, printer controllers, and printers.
- Ability to add up to 32 asynchronous devices, including minicomputers, PCs with async emulation packages, displays, and modems for dial-in.

6544 CONTROLLER

- Multi-host, multi-tasking windows. Users can bring data from multiple hosts (or multiple sessions with the same host) into four multi-tasking windows – all regardless of the type of host accessed.
- A choice from nine different types of displays. (Four are plug compatible with IBM 3270 controllers.)
- Cable and wiring flexibility. Host devices can be connected to the 6500 System through inexpensive twisted-pair wiring – or you can use coax.

Tomorrow's computing systems.

Computer technology is changing every day. And tomorrow's corporate workgroups will be even more diverse and decentralized. Forward-thinking MIS managers can protect their investments and plan for the future with the AT&T 6500 Multifunction Communication System. Its flexibility, transparency, and expandability will prepare you for anything the future has to offer.

To get more information, or to arrange a closer look, contact your AT&T Account Executive, Authorized AT&T Reseller or call 1 800 247-1212.

From equipment to networking, from computers to communications, AT&T is the right choice.

©1988 AT&T

[1]IBM is a registered trademark of International Business Machines Corp.

AT&T
The right choice.

Eyes front

CONTINUED FROM PAGE 101

"to be regarded as a highly efficient provider of computer and telcom resources to help meet business needs and objectives," he says. "I'm a very hands-on, detail-oriented and personnel-oriented manager. The technology is a tool that the individuals have to manage, have to direct, have to exploit."

St. Germain is also an unusual manager in one sense: He likes it when his people disagree with him.

"I need the staff to provide constructive criticism and an opposing viewpoint," he says. "We've got bright people here, and I don't want them to clam up for fear they'll be chastised if they disagree."

It was during his rise at Aetna that St. Germain embarked on one of his most educational assignments: the creation of a 121,000 sq.-ft. computer center in Middletown.

"It was a dream project," St. Germain says. "I not only helped design and build it but had the opportunity to run it once it was set up."

The opportunity to get his hands dirty in the design impressed on St. Germain the need for flexibility in his job. And that means using whatever it takes to get the job done.

"We're a committed multivendor shop," he says. But, he adds with a sigh, "that is often not an easy task."

In his technological array you'll spot IBM systems running alongside Amdahl Corp. equipment running alongside Xerox Corp. machines, and Prime Computer, Inc. boxes sitting next to ones from Digital Equipment Corp. or Data General Corp. His job has also been made tougher by the fact that attrition has slimmed Aetna's MIS staff by nearly 20% during the past few years and the higher-ups hope it can remain lean.

> "I'D LIKE TO take the technical knowledge I've gained in the job and apply it to other areas of the company. I feel I owe Aetna that."
>
> BOB ST. GERMAIN

Nevertheless, St. Germain is confident he can rally his remaining forces and launch a technological offensive for Aetna. "Telecom is just getting into its own, and there's been aggressive development and change in that arena," he says.

Plans include exploiting the use of expert systems in claims screening, underwriting and the review of medical records.

Unfortunately, MIS can only contain St. Germain for so long. "I hope this job leads beyond MIS," he says. "I'd like to take the technical knowledge I've gained in the job and apply it to other areas of the company. I feel I owe Aetna that."

MANAGERS ON THE MOVE

Martin Marietta moves Wiltshire into VP slot

Martin Marietta Corp. in Bethesda, Md., recently named senior research executive **Raymond S. Wiltshire** vice-president of computer-aided productivity.

Wiltshire, who had been executive director of the Oak Ridge National Laboratory at Martin Marietta Energy Systems, Inc., will be responsible for coordinating computer-aided productivity initiatives through Martin Marietta and ensuring their compatibility.

Wiltshire joined the organization in 1958. He holds a bachelor's degree in electrical engineering from Ohio State University and a master's degree in business administration from the University of Denver.

Jim Alonso is the new manager of MIS at **Dendrite Americas**, a Warren, N.J.-based subsidiary of software supplier Dendrite International.

Alonso assumes a newly created post in which he will report to Executive Vice-President Herbert E. Smith.

Alonso had been manager of technical support at LCS Industries, Inc. and spent seven years at Litton Industries, Inc. with management responsibilities in systems and operations. He is a graduate of the New Jersey Institute of Technology.

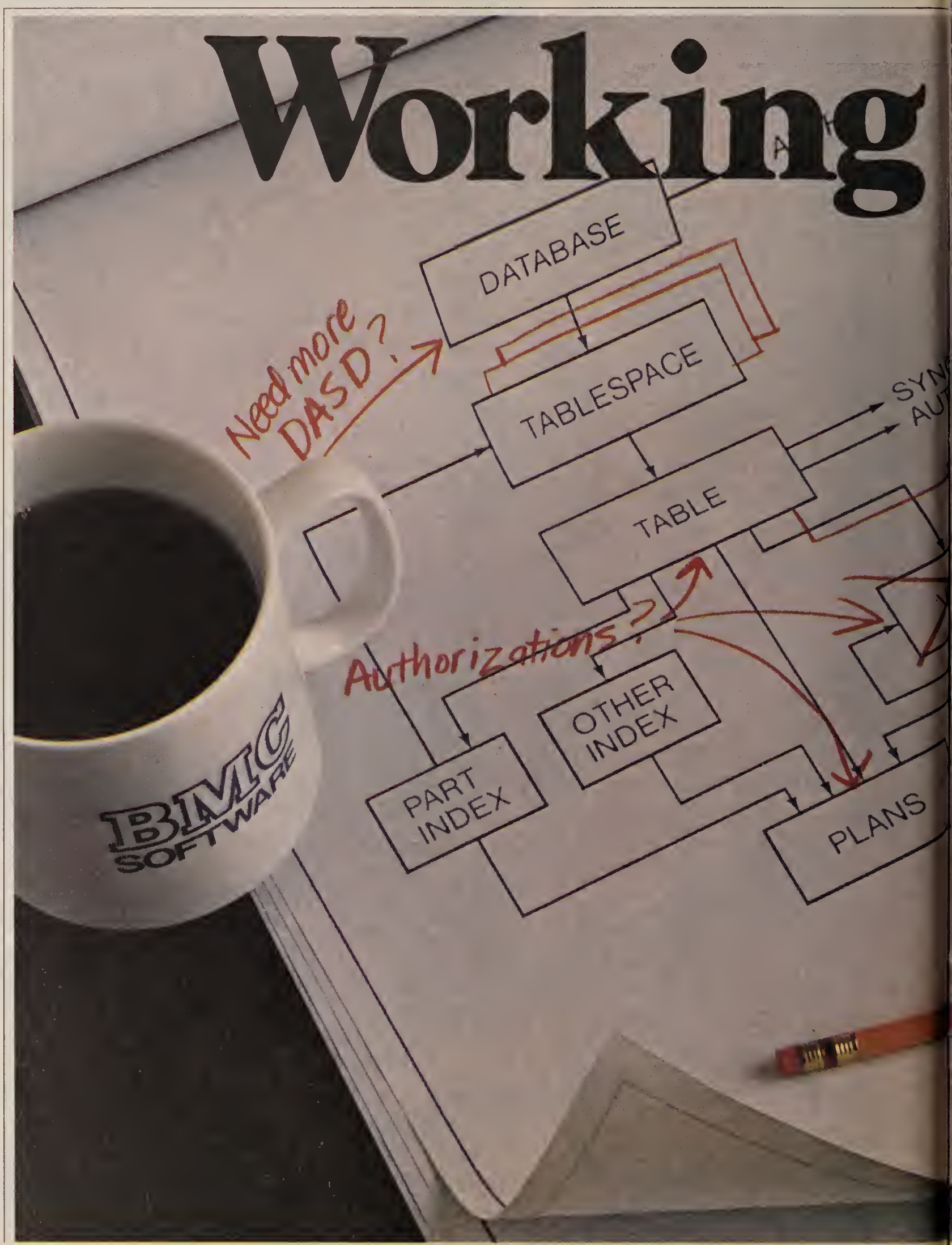
Alonso announced two promotions within Dendrite Americas' MIS department, naming Joan Hughes and Roy Svendson as project leaders.

Edward P. Pisula Jr. has been named manager of data processing at **Heinz U.S.A.**, a Pittsburgh-based division of H.J. Heinz Co.

Pisula is responsible for data processing and database operations, computer technical support, systems quality assurance and data control and preparation.

Pisula was previously manager of technical support at the Presbyterian-University Hospital in Pittsburgh; in addition, he held information systems posts at Blue Cross and Blue Shield of Western Pennsylvania and at Allegheny International, Inc.

He majored in accounting at Pennsylvania State University and earned a master's degree in information sciences at the University of Pittsburgh.



Brittain

CONTINUED FROM PAGE 101

Experienced programmers develop a working knowledge of useful routines. They use model or skeleton programs. They "steal" pieces of code from another program and modify them to meet their current needs. The technique is common. It makes sense. If the programmers don't have to write it again or think through a problem again, they don't. They keep a catalog in their heads and reuse that code.

I'm not talking about macros or copybooks or standard programmed algorithms, functions, intrinsics or subprograms that must be called. In the design of the programming environment, these common requirements were recognized.

IN NEARLY ALL minicomputer and mainframe shops, the technical environment is the last to be given organizational consideration.

In reality, there is an informal system that programmers use to be productive. It is most often represented in their knowledge of routines throughout a system, their personal libraries and their ability to outperform less experienced programmers. When organization is applied, that informal system and its resources become shareable. This raises productivity by giving the experience of knowledgeable programmers to those who are just learning a particular language or system. Even experienced programmers can become more productive and responsive.

Using what's there

The idea is simple, and the system already exists. The idea is to formalize the programmer's informal catalog and references — human or otherwise — into a workbook of modifiable routines. I call mine "pages." Their advantage is that they are modifiable and already contain the basic logic that is required. In some cases, the advantage applies to the use of standard functions.

An obvious candidate for any programmer's library is the coding required to produce a report, and this should serve as a good example. I have five report pages in my library. When I am working on a program that requires a report, I include the routines in the text at the appropriate place and make any needed quick modifications.

The report pages I use are an initialization routine, a detail-line formatting routine, a print routine with header logic, an end-of-job routine and a storage page containing definitions for two headers and a detail line.

I could have written these as macros with selected parameters, but instead I just stored the code in a library. In this way I have the advantage of having prewritten and stored code — but with greater flexibility. While I am programming, I don't have to consider the details of it, either.

The member name becomes just like a high-level instruction name, but one that I've written and can modify internally. As an aid, I include a library member called "Index" that lists and documents all of the other members. That simple innovation is useful in any case.

In general, I keep storage definitions with the page that uses them and, even in the case of IBM assembler, keep the definitions within the program next to the routine, instead of placing them at the back. It is convenient to see the storage while viewing the code, rather than having to look it up in a cross-reference. It reduces errors and encourages modular programming.

Serendipity

Often, programmers have to code a special or difficult call or routine that requires extensive research. Often, the correct use of some of the required parameters for these routines is discovered by accident, by trial and error or by reference to another program.

If the programmer simply saves it and prepares it for future use, time and errors are saved and the routine becomes available to others as just another part of the repertoire instead of something to avoid.

I have my own conventions for coding the routines and for helping me recall and organize them. It's been very productive. The catalog is based on the informal or manual system of programming.

Good programmers use an approach; however, it is not shareable, it is not formal and it is somewhat inefficient. The average programmer hasn't even thought of it yet. The point is to just get organized.

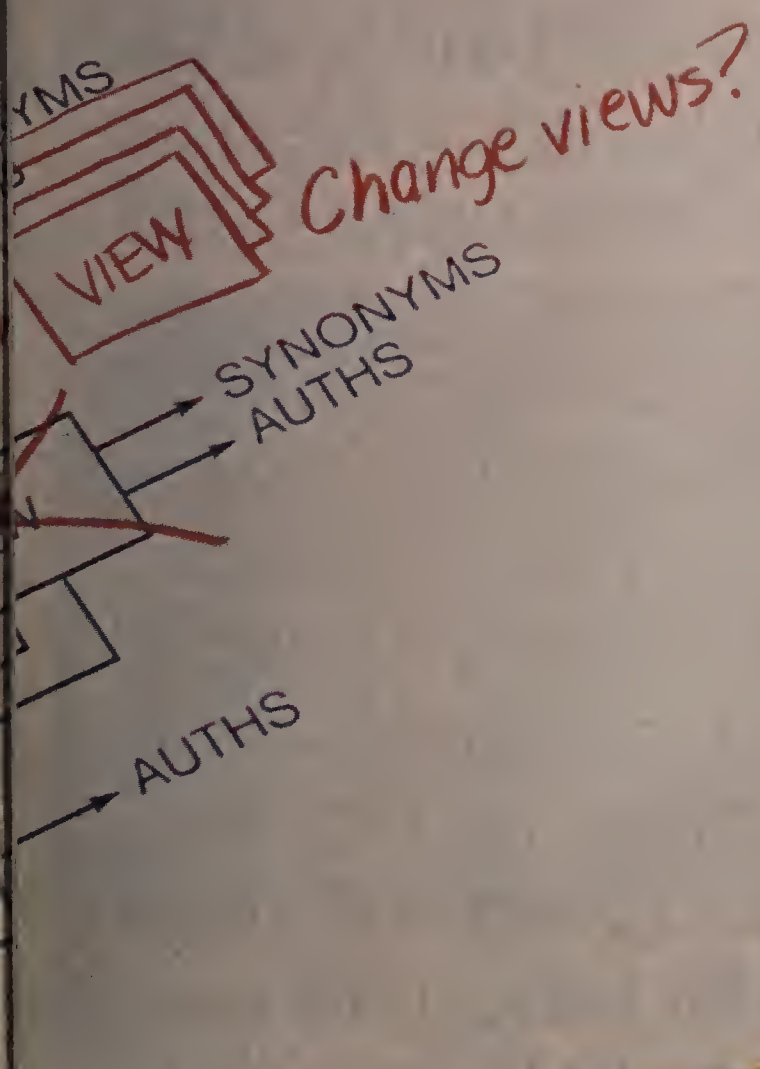
I believe this approach can provide the basis for an automated programming system that organizes the programming environment regardless of language. The informal systems should have evolved further but didn't. I think the reason is the arbitrary limitation on the length of member names. Eliminating that restriction would open up many possibilities.

Hopefully, whatever productivity improvements are made, the resulting savings in time and effort will be used to purchase more quality time and effort. That is the only way to grow.

Brittain is a senior programmer analyst and team leader at Capital Holding Corp. in Louisville, Ky.

with DB2?

Work with BMC



DB2 can be a lot more work than you expected with quite a bit less help than you need. But when you've got BMC Software's comprehensive set of data base administration tools–which include standard interfaces and integrated function–you can reduce your costs and make your work fast, easy and error-free.

DB2 ALTER–provides complete support for changing, copying and migrating DB2 data structures; includes data conversions, authorization-id switching and restart capabilities.

DB2 CATALOG MANAGER–gives quick and easy catalog information, execution of SQL DDL and DB2 utilities, audit logs and extended SQL function.

DB2 DASD MANAGER–controls the life cycle of physical objects with comprehensive space analysis statistics; also includes space estimation, AMS command and utility jobstream generation and action triggers.

DATA PACKER™/DB2–reduces DASD requirements for DB2 tables an average of 50% to 70%; reduces EXCPs.

DB2 REORG PLUS–reorganizes DB2 tables 4-10 times faster than the supplied DB2 utility; provides dual image copy and statistical history.

For more information or to begin a 30-Day-Plus Free Trial of any or all of these products, complete and return this coupon or call BMC Software, Inc., **The Complete DB2 Company.™**

In the U.S. and Canada: **1-800-841-2031**
In Texas, call collect: 713-240-8800 Japan (03) 837-8651
France (16-1) 48 77 77 77 United Kingdom (0276) 24622
Italy (02) 48193845 West Germany (069) 664060

BMC Software, Inc.
P.O. Box 2002
Sugar Land, TX 77487-2002
1-800-841-2031
or call collect: 713-240-8800

BMC SOFTWARE

Contact me about:

Free Trial	More Info	
☐	☐	DB2 ALTER
☐	☐	DB2 CATALOG MANAGER
☐	☐	DB2 DASD MANAGER
☐	☐	DATA PACKER™/DB2
☐	☐	DB2 REORG PLUS
☐	☐	All BMC DB2 products

Name _____
Title _____
Company _____
Address _____
City _____ State/Prov. _____ Zip/P.C. _____
Phone _____
CW

Give this to and you hear from

Upgrading mass storage used to mean one interruption after the other.

Your users were easily confused.

And you weren't always free to answer questions like, "How do I set up a subdirectory?" Or, "How do I upgrade the DOS on my hard disk?"

But, all that's changed. With Plus Hardcard™ 40 you can upgrade your users to 40MB easily and never have to worry about it again.

Because the Hardcard was specifically designed with the end user in mind. It's completely different from other hard disks. For example, you won't have to personally install the Hardcard. Most of your users can do it in minutes. There's no system reconfiguration. No connector cables or adapter cards. And there's plenty of simple documentation ready to help those who don't know their keyboards from their clipboards. There is even a toll-free technical support number for installation and user information.

Plus Technical Support Line
1-800-826-8022

Plus and Hardcard are trademarks and the Plus logo is a registered trademark of Plus Development Corp., a wholly owned subsidiary of Quantum Corp. Trademarks/owner: IBM/International Business Machines Corporation;

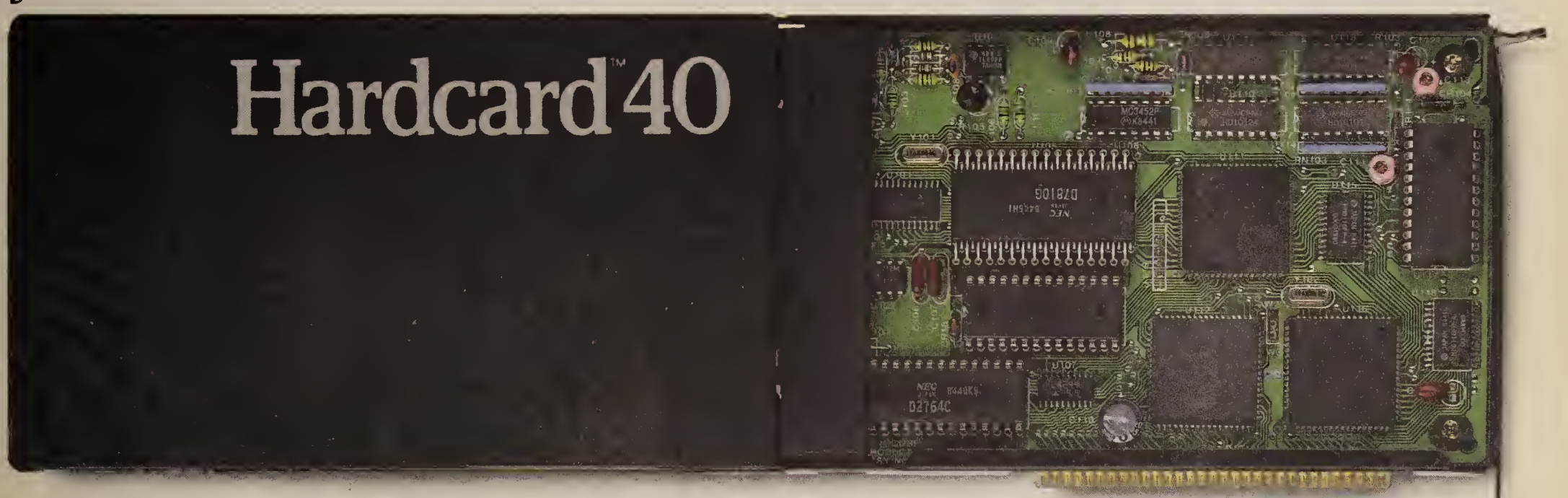
your users will never them again.

So if any of your people have immediate questions, you won't have to be the one with all the immediate answers.

More importantly, Plus Hardcard is the most reliable (40,000 hours MTBF) fixed disk available. It also happens to be extremely fast (access time 35 ms) and durable (100 Gs).

And it's compatible with some of the biggest names in the business. IBM®. COMPAQ®. Wyse®. And more.

So if upgrade interruptions have kept you from getting to bigger issues, call us for complete compatibility and other technical information at 1-800-826-8022.



Plus®

COMPAQ/Compaq Computer Corporation; Wyse/Wyse Technology. © 1988 Plus Development Corp.

PCs smooth

CONTINUED FROM PAGE 101

This was not always the case. Ten years ago, when computers were simplifying mundane office tasks, they were turning the job market into a living hell for the disabled. Just ask Olga Espinola, a native of Cuba who has been blind since she was a 2-year-old.

"A few years back, I just didn't consider myself competitive, but that's really changed," says Espinola, while nimbly dodging cars and potholes in the concrete jungle of downtown Boston. She stops deftly just before a white Lincoln Continental, oblivious to her red-tipped cane poking into the road, roars past.

Poor technology prior to 1985

"Up until about 1985, we had very poor technology for making the PC accessible to the handicapped. Without that skill, it was very difficult to go for the good jobs," she adds while hurrying to her job as a management trainee in the research and development department of New England Telephone and Telegraph Co.'s technology support group.

Suddenly equipped with the skills to compete, Espinola quickly made a move into a field that recently had seemed to be passing her by.

"Information systems is very alluring for the handicapped," says Jim Vagnoni, chairman of the Association of Rehabilitation Programs in Data Processing. "The work is essentially sedentary, and it's going to pay enough so it is not a disincentive to go to work. Some quadriplegics must pay as much as $20,000 a year for special devices and a specially equipped van just to arrive in the office each morning."

At the University of Pennsylvania Center for Information Resources (CIR), the staff believes the disabled are not only employable but in great demand. Through the CIR's various MIS training programs, students are equipped with a battery of technological computer knowledge and then offered three-month internships at local businesses.

Espinola's system *reads printed material out loud.*

In a seller's employment market, both national and local businesses seem eager to scoop up the abilities offered by CIR alumni. Since its inception in 1976, the center has placed more than 90% of its graduates in full-time data processing jobs, with some starting salaries hitting $27,000.

After graduation, many handicapped workers find a receptive niche. A Du Pont Co. survey of 1,452 handicapped employees found that they demanded no special compensation and often sported glowing safety and attendance records. The survey also discovered that handicapped workers often made only one request: to be treated as regular employees.

Employers agreed. "They are not handicapped programmers, they are good programmers who happen to be handicapped," says Harvey Karlin, manager of EDP training at First Pennsylvania Bank. In the highly competitive computer business, some companies have discovered a virtually untapped mother lode of qualified workers and are not only hiring the handicapped, but are actively seeking them out.

The Arlington, Va.-based Adapso Foundation, an arm of the software and computer services industry trade association, now links computer software and services firms in the Los Angeles area with disabled workers seeking jobs.

Employers are also abandoning the financial prejudice that had once hindered employing the handicapped. "A big question used to be, 'Am I simply hiring a blind person or am I hiring a blind person plus the thousands of dollars in equipment they'll need to work in our office?' " Espinola says.

In many cases, state and local rehabilitation agencies now level the playing field by offering to pay for any unusual equipment required. Even special equipment can be relatively inexpensive — a PC equipped with speech hardware and software often costs less than $5,000 — and tax breaks are often available.

But these considerations are often unnecessary, says Handisoft President John Connolly, adding that adapting work-related equipment for disabled workers is often neither difficult nor expensive. "Accommodations can be as easy as raising a desk slightly so a wheelchair can fit underneath it," Connolly says.

Even those whose disabilities bind them to the home are finding inroads into the information systems world. Tapping into an office mainframe is now as simple as hooking up to a modem.

With the technological strides have also come profits. Providing machines to the handicapped is a $50-million-a-year market in the U.S., says James Bliss, whose Telesensory Systems firm in Palo Alto, Calif., provides equipment to the blind and visually impaired. "The market has quite simply exploded," Bliss says; his company was a lone eagle when it began in 1971 but now shares its niche with dozens of others.

An array of speech synthesizers, braille computer printers, tools that enlarge type on a screen up to 16 times normal size, voice-recognition software, keyboard emulators and equipment that can be activated by the blink of an eye or the wrinkle of an eyebrow are available for nearly any type of disability.

Releasing potential

Machines that assist the handicapped are not just making waves among the myriad workers handling everyday chores at thousands of offices across the country. They have also helped release the potential of what may be one of the greatest minds of our time.

In England, 46-year-old scientist Stephen Hawking sits twisted in a wheelchair, unable to speak. For the past several years, Hawking has been paralyzed by amyotrophic lateral sclerosis, more commonly known as Lou Gehrig's disease.

Hawking, a professor of mathematics at Cambridge University, is the author of the best-selling survey of modern cosmology, *A Brief History of Time*, in which he explores the Grand Unification theory — a theory linking relativity and quantum mechanics that Einstein sought for years in vain to prove.

But Hawking would not have been able to offer a word from the vast creative fields of his mind were it not for a 12-pound computer that processes close to 2,600 words at a time. He communicates by a barely perceptible twitch of his finger, generating one computer-synthesized word every six seconds and taking an entire day to compose a 10-page lecture.

Managing Micros by the Books:

PC WORLD — MRM "serves as a self-contained environment for the business of micro management. . .well conceived and designed, packing a great deal of power and flexibility. . ."

PC WEEK — MRM "makes the task of tracking PC equipment highly efficient and effective. . .its ease-of-use factors make accessing the valuable information it contains surprisingly easy."

INFO WORLD THE PC NEWS WEEKLY — MRM does everything you could possibly want from a product like this and more. . .valuable, well thought-out, and very powerful. . ."

The Micro Resource Manager is the most comprehensive and sophisticated software available for managing, supporting, and analyzing the use of microcomputers. Track hardware, software, peripherals, or services—by item or by system. Track PCs, minis, or mainframes. Analyze budgets and trends. Send memos to selected users. Log, track, and cost user requests for support. MRM has the features you need for **greater efficiency** and **increased control.**

MRM's advanced user interface makes use of menus, windows, function keys, record scrolling, and 'zoom' keys for rapid cross-searching of data and effortless navigation through the database. Rigorous data validation, automatic database recovery, and multi-level user security insure system integrity. Single-user (MS-DOS) and multi-user LAN versions.

Over **200 reports and queries** provides fast and flexible access to essential information in these key areas:

- Inventory Tracking
- Configuration Mgmt.
- Maintenance Mgmt.
- Purchasing & Receiving
- On-line Tech Notes
- Network Config. Mgmt.
- Management Analysis
- Problem Tracking

Call or write today for our FREE demo diskette. Or better yet, order our one-hour MRM video.

The Micro Resource Manager™

200 W. Lowe, Fairfield, Iowa 52556 • (515) 472-6400

COMPUTER® ASSOCIATES
Software superior by design.

Videos Teach UNIX®& C Best

Hands On Learning videos are the corporate standard. Read Why.

Learning UNIX or C Language used to be a difficult and frustrating experience. But now, using the powerful video instruction techniques developed by Hands On Learning Corporation, learning is fast, easy, and *cost-effective.*

The Best Way to Learn

Hands On Learning's video training is unique among educational videotapes. Complete and accurate technical content and professional TV-like production quality improve retention by over 300%.

Two Thumbs Up!

"People watch the tapes, learn UNIX and C, and are highly entertained," says Mr. Van Lieuw, training manager for Mass-Comp. "I am thrilled that learning UNIX and C can be so enjoyable," says Dr. Eckhouse in IEEE magazine.

® UNIX is a registered trademark of AT&T

The Price is Right

The UNIX Video Workshop consists of 10 modules, a textbook, a workbook, and a workdisk, and sells for $2,900. The C Video Workshop consists of 6 modules and a similar set of student materials, and sells for $1,595. Rentals are also available.

Teach Staff or Customers

Join thousands of viewers from companies like AT&T, DEC, IBM, HP, and Honeywell who have solved their training needs quickly and economically with the Hands On Learning Video Workshops.

Call ☎ **800-537-0040** or write:

Hands·On Learning CORPORATION

27 Cambridge Street, Burlington, MA 01803

Just a few
months ago,
computers this powerful
were tracking
planetary movements,
pondering
quantum physics
and building
rockets.

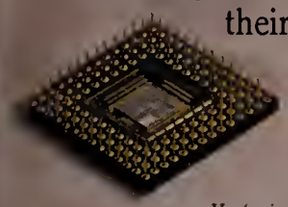
Now they're taking

care of business, too.

Introducing the COMPAQ DESKPRO 386/20e. 20-MHz 386 performance designed to fit the increasingly sophisticated needs of 286 users.

People who work with 386 personal computers used to be called rocket scientists. Now they're also called accountants, engineers, managers and CEO's. Thanks to the new COMPAQ DESKPRO 386/20e.

It delivers 386 power to people whose demanding needs have outgrown the capabilities of their 286 PC's. Better yet, it packs all this power into a design that fits neatly on your credenza.



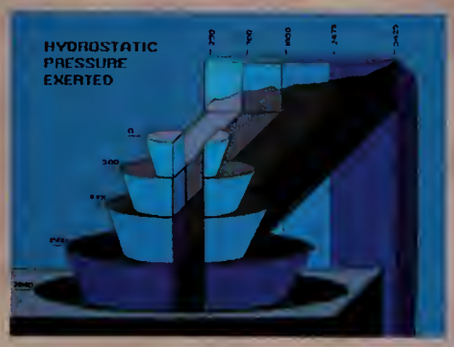
You're in business with a 20-MHz 386 microprocessor.

Start with speed. Everything in the new COMPAQ DESKPRO 386/20e is optimized to go faster.

Its 20-MHz Intel 386™ microprocessor with cache memory is surrounded by the exclusive COMPAQ Flexible Advanced Systems (Flex) Architecture. This high-speed combination runs the world's largest library of software 25% faster than non-cache 20-MHz 386-based PC's. And 50% faster than non-cache 16-MHz 386-based PC's.

Choose 5¼" and 3½" diskette drives.

Its optimized 32-bit design also enables you to take full advantage of powerful 386 software and multitasking operating systems such as Microsoft® Windows/386, MS® OS/2, XENIX® and UNIX.

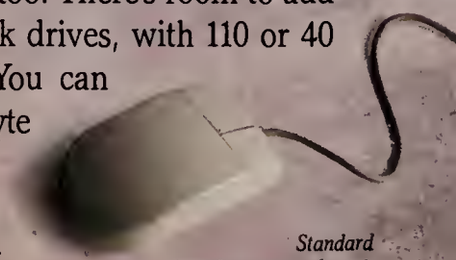


High-speed VGA graphics are built in.

You'll find that a long list of high-performance features is built in. One megabyte of memory. Sharp, high-speed VGA graphics. Support for 5¼" and 3½" diskette drives. And standard interfaces to connect a printer, mouse and communications devices.

Of course you have growth potential. Five expansion slots are available: four for a network card, mainframe communications board, modem or other devices, and one high-speed 32-bit slot that allows you to expand memory up to 16 megabytes.

You have options, too. There's room to add two high-speed fixed disk drives, with 110 or 40 megabytes of storage. You can choose a 135- or 40-megabyte tape backup. Or match the number-crunching power of a dedicated engineering workstation by adding a powerful Intel 387™ or Weitek 3167 coprocessor.



Standard interfaces are on board.

With its integrated design and performance, the COMPAQ DESKPRO 386/20e represents the ultimate space vehicle.

COMPAQ

It simply works better.

Compaq makes high performance everybody's business.

COMPAQ DESKPRO 386 S

COMPAQ DESKPRO 386/20e

COMPAQ DESKPRO 386/25

Whether you use a personal computer for launching rockets or corporate acquisitions, Compaq delivers the highest-performing solution.

For those who want everything, now, the COMPAQ DESKPRO 386/25 is the most powerful PC available. For growing performance requirements, the new COMPAQ DESKPRO 386/20e is a move into the power structure. And for users considering 286 PC's, the COMPAQ DESKPRO 386s is an affordable route to the fast track.

These PC's are simply the highest-performing in the world. That's one reason PC experts rate COMPAQ highest overall. And why for the past four years COMPAQ has been added by more FORTUNE 1000 corporations than any other brand.

To make this performance part of your business, call 1-800-231-0900, Operator 70. In Canada, 1-800-263-5868, Operator 70. We'll give you the location of your nearest Authorized COMPAQ Computer Dealer and a free brochure.

COMPAQ® is a trademark of Compaq Computer Corporation. Intel®, Intel 386 and Intel 387 are trademarks of Intel Corporation. Microsoft®, MS® and XENIX® are trademarks of Microsoft Corporation. MS® Windows/386 and MS® OS/2 are products of Microsoft Corporation. Product names mentioned herein may be trademarks and/or registered trademarks of their respective companies.
®Registered U.S. Patent and Trademark Office. COMPAQ DESKPRO 386/25 graphics ©1988 Accent Software, Inc. ©1988 Compaq Computer Corporation. All rights reserved.

COMPAQ

It simply works better.

INDUSTRY INSIGHT

Bohdan O. Szuprowicz

AI hits the real world

The benefit of expert systems deployed by major corporations was a major topic discussed at the American Association of Artificial Intelligence (AAAI) '88 conference this past August in St. Paul, Minn.

A recent study conducted by Edward Feigenbaum of Stanford University found that in mid-1988, about 2,000 expert systems were put into production. Of these, 1,500 are deployed in the U.S., 250 in Japan and another 250 in Europe.

Thus, the bulk of expert systems activity is currently concentrated in research and development stages. Expert systems currently used in businesses represent only about 2% of the estimated expert system development shells that have been sold worldwide by more than 100 different vendors.

However, the advent of low-cost hardware platforms based on high-speed Intel 80386 microchips guarantees an explosion in development and deployment of expert systems during the 1990s.

Noses to the grindstone

Several supercomputer start-ups, such as Active Memory Technology, Cogent Research, International Parallel Machines, Key Computer Laboratories, Prisma, Privac and Topologix, are at work developing very high-performance parallel-processing workstations.

At the AAAI '88, several presentations described users' initial attempts to measure and classify the benefits resulting from deployment of production expert systems in various applications. These included a wide spectrum of applications ranging from extremely simple, form-filling systems to the most complex real-time scheduling implementations.

One of the greatest findings reported by the researchers who conducted the Feigenbaum study was the universal speedup of professional and semiprofessional work activities whenever

Continued on page 110

Young-minded Krowe moves on

Retires after 28 years with IBM, assumes high-level position at Texaco

BY CLINTON WILDER
CW STAFF

ARMONK, N.Y. — IBM Executive Vice-President Allen J. Krowe took a highly unusual step last week by retiring from IBM for a new career in another industry.

Krowe, formerly IBM's top financial executive, was named senior vice-president and chief financial officer of beleaguered petroleum giant Texaco, Inc. The 56-year-old executive officially retired this past Saturday after 28 years of working at IBM.

Texaco's Krowe

While the computer industry is full of ex-IBMers, few of them have reached the elite level that Krowe reached, who was one of five members of the IBM Management Committee reporting directly to Chairman John F. Akers. "I can't remember anyone at that level going to another company and certainly not to another industry," said Jack Hart, a vice-president at Framingham, Mass.-based market research firm International Data Corp. and a veteran of IBM.

In an interview, Krowe said his move was partly motivated by IBM's policy of mandatory retirement at age 60. "I feel young and feel that I can make vital contributions until the middle of the next decade," he said. But he defended the retirement policy, saying it keeps IBM "charged up and moving."

Krowe was once considered a potential candidate for the IBM presidency by company observers, but his last two job changes moved him away from that path, analysts said.

His move from the top IBM financial job to lead development and manufacturing for several product lines in 1986 indicated IBM's dissatisfaction with his optimistic financial growth forecasts that IBM failed to meet, said Bob Djurdjevic, president of Annex Research in Phoenix.

In IBM's major U.S. management reshuffling that occurred last January, Krowe was named to the new position of executive vice-president with direct responsibility for real estate and construction as well as review responsibility for mid-range and

Continued on page 113

MSI blocks Telxon with other firm

BY NELL MARGOLIS
CW STAFF

COSTA MESA, Calif. — MSI Data Corp. said "tough tender" to archrival and would-be acquisitor Telxon Corp. last week and entered into a definitive merger agreement with Symbol Technologies, Inc.

Under the contract, the Bohemia, N.Y.-based "white knight" will acquire MSI at $23 per share, a $3 per share premium over Telxon's latest offer.

The announcement came immediately after an exchange of Telxon-MSI countersuits that added charges of securities law breaches and the spreading of false and misleading information to the patent disputes already pending between the two companies. Akron, Ohio-based Telxon is the hand-held computing market leader, and MSI, based here, is its biggest competitor.

Symbol Technologies, which currently owns about 4.5% of MSI's common stock, is an expert in bar-code laser scanning.

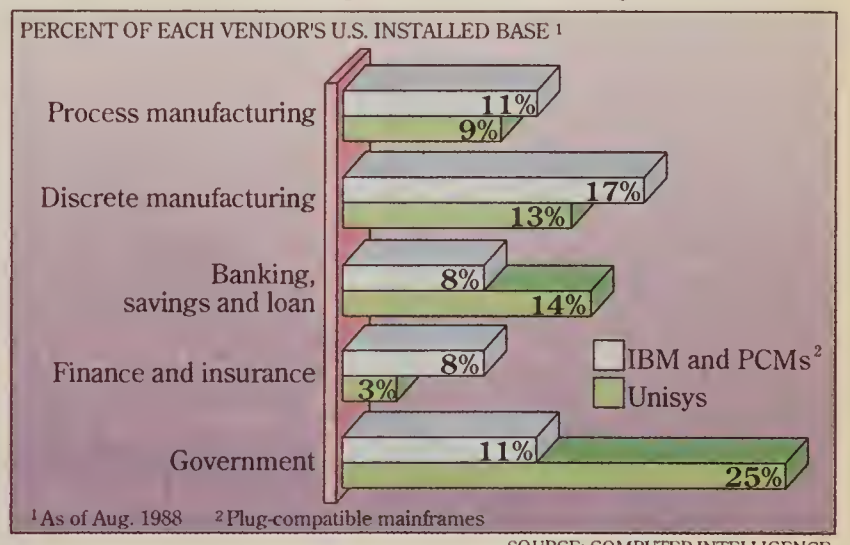
Legal unpleasantries notwithstanding, Telxon neared the week's end still determined to

Continued on page 113

Data View

Unisys vs. IBM: Where the sites are

A full quarter of Unisys installations are government sites; IBM's strength lies in manufacturing



SOURCE: COMPUTER INTELLIGENCE
CW CHART

More Infinet jobs cut; manufacturing hit

BY AMY CORTESE
CW STAFF

The ax continues to swing at Memotec Data, Inc.'s Infinet subsidiary in Andover, Mass.

Since the abrupt firing of President Nick Papantonis and other top executives last month, 45 more employees in engineering, customer support, manufacturing and finance have been let go.

So far, an estimated 60 of Infinet's 200 employees have been dismissed, according to one who was let go.

According to Andre Deslauriers, a company spokeswoman, the layoffs have involved mostly management in an attempt to avoid duplication of positions.

But manufacturing has also suffered heavy cuts, according to sources. Deslauriers confirmed that "30-odd" employees have been laid off within manufacturing.

This raises uncertainties, since Memotec has virtually no manufacturing facilities of its own. Deslauriers revealed that the layoffs were intended to make manufacturing more cost-effective and that operations in Andover would be run more like those in the firm's Montreal facility.

The Montreal site has a smaller manufacturing operation, consisting of only 30 or so employees. Most manufacturing is farmed out, and only assembly and some customization are actually performed on site.

More moves ahead?

Memotec recently acquired shares of Infotron Systems, Inc., a Cherry Hill, N.J.-based seller of statistical multiplexers and a reseller of Infinet modems. There has been speculation by some industry observers that Memotec might acquire Infotron and combine the operations of the Andover subsidiary.

> DESLAURIERS revealed that the layoffs were intended to make manufacturing more cost-effective.

At a Wednesday press conference held at the Telecomm Association in San Diego, Memotech officials stated that Memotec will continue its strategy of growth by acquisition.

The Infinet layoffs apparently did not result from red ink at Infinet. Deslauriers confirmed that Infinet is profitable. The firm also recently signed a potentially lucrative agreement with Bellsouth Advanced Systems under which the telephone company would market Infinet's modems and network management products.

The Memotec parent company, also based in Montreal, decided recently to merge the Memotec operating unit with the Infinet subsidiary. The two data communications divisions will operate as a single business unit called Memotec Infinet.

The other divisions of the Memotec parent are telecommunications services, which is the Teleglobe subsidiary; a systems integration division providing turnkey solutions to insurance firms and municipal governments; and a consulting division.

Szuprowicz

CONTINUED FROM PAGE 109

production expert systems are deployed.

Their findings reveal that one order of magnitude (10x) speedup is common, and two orders of magnitude (100x) is possible and reached occasionally when expert systems are deployed to automate various decision making processes.

The study suggests that expert systems in technical marketing and engineering exhibit the highest speedup factors. These range from 300x to 360x in the cases of system configurators deployed by leading hardware firms such as DEC and IBM.

It is no surprise, therefore, that practically all other hardware vendors, as well as many data communications and networking suppliers, are developing or fielding expert system configurators to stay competitive in the market.

Airline scheduling and investment portfolio optimization, such as systems deployed by All Nippon Airways and Sanwa Bank in Japan, showed the next highest work speedup factors of about 80x. A continuous-strip steel plant scheduling expert system implemented by NKK Steel, also in Japan, is credited with a speedup factor of 25x. At Northrop in the U.S., an expert system coupled with a manufacturing resource planning activity increased operation by 16x to 18x.

The study also revealed that in mid-1988, diagnostic expert systems accounted for more than 50% of all production expert systems deployed by major corporations that were included in the survey sample. The second most common usage was classified as knowledge-delivery applications — defined as selection of and advice on products and procedures in context of specific situations. Expert systems for scheduling, however, are now seen as the fastest upcoming application in manufacturing.

DEC has reportedly realized savings of between $70 million and $100 million annually through deployment of embedded expert systems in its operations.

Szuprowicz is managing consultant of the expert systems practice at Computer Task Group, Inc.

Massachusetts Institute of Technology • Carnegie Mellon University • University of California at Berkeley • Cornell University • University of Illinois at Champaign-Urbana • University of California at Los Angeles • Yale University • University of Washington at Seattle • University of Texas at Austin • University of Wisconsin at Madison • University of Maryland at College Park • University of Southern California • Princeton University • University of Utah • State University of New York at Stony Brook • Brown University • New York University • University of Pennsylvania • University of Rochester • University of Massachusetts at Amherst • University of Minnesota • Georgia Institute of Technology • California Institute of Technology • Ohio State University • Rice University • Duke University • Northwestern University • State University of New York at Buffalo • Syracuse University • University of California at Irvine • University of California at San Diego • Columbia University • Rutgers - The State University of New Jersey • Indiana University at Bloomington • Pennsylvania State University • University of California at Santa Barbara • University of Pittsburgh • Iowa State University • University of Kansas • University of Virginia • Vanderbilt University • University of Iowa • University of Connecticut at Storrs • Southern Methodist University • United States Naval Academy • United States Military Academy • University of Houston - University Park • Rensselaer Polytechnic Institute • Washington University • Michigan State University • Polytechnic Institute of New York • Stevens Institute of Technology • Case Western Reserve University • Texas A&M University • University of Oklahoma • Kansas State University • University of Michigan at Ann Arbor • Washington State University • Harvard University • University of Pennsylvania • Stanford University • Massachusetts Institute of Technology • University of Chicago • Columbia University • University of California at Los Angeles • Indiana University at Bloomington • University of California at Berkeley • Univ... of Michigan at Ann Arbor • Northwestern University • Carnegie-Mellon University • University of Illinois at Urbana-Ch... Dartmouth College • New York University • Cornell University • University of Pittsburgh • University of Texas at Austi... sity • University of Wisconsin at Madison • University of Virginia • Purdue University at West Lafayette • University ... Chapel Hill • University of Washington • Michigan State University • Ohio State University • Texas A&M Uni... nesota at Minneapolis • Case Western Reserve University • University of Southern California • University o... University of New York • Lehigh University • University of Oregon • Emory University • George Wa... stitute of New York • University of Utah • Georgia Institute of Technology • University of Flo... y Park • University of Rochester • Pennsylvania State University • Washington University ... iversity • State University of New York at Buffalo • Syracuse University • Univer... te University • Boston University • Arizona State University • University of C... llins College/Crummer • Vanderbilt University • Auburn Univer... hern Arizona University • University of Arizona • University of Arkan... lifornia State University at Long Beach • California State Univers... State University • University of California at Davis • Uni... University of Southern California • University of the Pac... Connecticut • University of District of Col... rida • University of South Florida • Universit... Tulane University • Boston Univers... Massachusetts at Amherst • Mich... University • University of Mi... University of New Mexico ... Rochester Institute of T... • Ohio State Univers... University of Pennsylv... University of Texas at A... Milwaukee School of Engi... Berkeley • Cornell Universit... University of Washington at S... College Park • University of Sou... Brook • Brown University • New Y... Amherst • University of Minnesota • ... University • Duke University • Northw... California at Irvine • University of Califo... University at Bloomington • Pennsylvania ... State University • University of Kansas • Uni... Storrs • Southern Methodist University • Unit... University Park • Rensselaer Polytechnic Institu... York • Stevens Institute of Technology • Case Wes... State University • University of Michigan at Ann Ar... • Stanford University • Massachusetts Institute of Tec... Los Angeles • Indiana University at Bloomington • Univ... Northwestern University • Carnegie-Mellon University • U... University • Cornell University • University of Pittsburgh • U... Madison • University of Virginia • Purdue University at West ... Washington • Michigan State University • Ohio State University ... Western Reserve University • University of Southern California • ... Lehigh University • University of Oregon • Emory University • Geo... University of Utah • Georgia Institute of Technology • University ... Rochester • Pennsylvania State University • Washington Uni... University of New York at Buffalo • Syracuse University • U... Boston University • Arizona State University • University ... College/Crummer • Vanderbilt University • Auburn Univer... University • University of Arizona • University of Arkansa... University at Long Beach • California State University at ... University • University of California at Davis • Universit... of Southern California • University of the Pacific • Uni... Connecticut • University of District of Columbia • Flor... University of South Florida • University of Illinois a... Tulane University • Boston University • Massachus... Massachusetts at Amherst • Michigan State Univer...

Recruit top computer career students at America's universities and colleges without leaving your office!

Don't miss *Computerworld's* Campus Recruitment Edition, a special edition of *Computerworld* written just for and distributed only to university and college students planning computer careers!

Issue date: October 28

Closing date: September 30

For more information or to place your ad, call John Corrigan, Recruitment Sales Director, at 800/343-6474 (in MA, 508/879-0700).

COMPUTERWORLD

An IDG Communications Newspaper

IN BRIEF

Alpha annexes Doelz

Alpha Microsystems announced the intention to acquire privately held **Doelz Networks, Inc.** in Irvine, Calif., for an undisclosed amount. Alpha Microsystems' option to acquire, which expires Oct. 7, is subject to the approval of the Alpha board. Doelz, founded in 1979, is a vendor of data communications equipment for multi-vendor environments. Doelz employs about 150 people. Separately, Alpha Microsystems announced a profit of $605,000, or 19 cents per share, on revenue of $12.7 million for the quarter ended Aug. 28.

. . . . . .

Relational Tech's COO now CEO too

Alameda, Calif.-based **Relational Technology, Inc.'s** President and Chief Operating Officer Paul Newton entered the new month with a third title, replacing company co-founder and Chairman Gary Morgenthaler as chief executive officer of the booming database vendor. Under Newton's stewardship, the maker of the Ingres relational database management system recently finished a year that saw profits triple and revenue rise nearly 90%.

. . . . . .

Blue-blooded VP tackles Bull

Once again proving itself a connoisseur of pedigree, **Honeywell Bull, Inc.** announced a newly created position — vice-president of general products, product line management — and the appointment of ex-IBM Unix maven Daryll Wartluft to fill it. Wartluft, a 23-year IBM veteran, most recently headed up AIX Systems for the company, simultaneously serving as a leading IBM liaison to the Open Software Foundation. At the soon-to-be Massachusetts-based Honeywell Bull, he will shoulder worldwide responsibility for bridging engineering, manufacturing, marketing and business planning for peripherals, cross-systems software and — surprise, surprise, surprise — Unix.

. . . . . .

Comdisco creates CAE division

The world's largest independent computer leasing firm has gone techie. **Comdisco, Inc.** announced the creation of a subsidiary, **Comdisco Systems, Inc.**, that will develop and sell computer-aided engineering (CAE) software used in the design of digital signal processors and communications systems. Much of the technology will come from CAE software firm Star, Inc. in Lawrence, Kan., which Comdisco acquired to be part of Comdisco Systems.

U.S. lessor gets gobbled

Elsewhere in the leasing business, the pace of consolidation continued unabated. **Atlantic Computer Systems, Inc.**, the U.S. subsidiary of UK-based Atlantic Computers PLC, acquired **Datalease Corp.** in Westport, Conn., for an undisclosed amount. Atlantic has stated the intention of boosting its U.S. business by acquiring smaller U.S. firms. Datalease, with annual revenue of $25 million and a lease portfolio of $65 million, specializes in leasing IBM and other mid-range computers in the New York metropolitan area.

. . . . . .

Weyerhaeuser shuffles execs

Weyerhaeuser Information Systems announced the appointment of Susan M. Mersereau to the top position of vice-president and general manager. She replaces Frank K. Guthrie, who became vice-president of Weyerhaeuser Paper Co.'s Longview, Wash., plant. Mersereau has been director of telecommunications at Weyerhaeuser Co., the parent company, since 1982.

. . . . . .

Zenith raider swaps court

The battle for control of **Zenith Electronics Corp.** continued as corporate raider **Brookhurst Partners Limited Partnership** moved its lawsuit against Zenith from federal to state court in Delaware. Brookhurst's suit in federal court had been dismissed on jurisdictional grounds. Brookhurst reportedly wants to acquire Zenith to sell its unprofitable consumer electronics business and control Zenith Data Systems, a profitable division.

. . . . . .

Sign of the times

The Transportation Data Coordinating Committee officially changed its name to **TDCC: Electronic Data Interchange Association.** The Washington, D.C.-based group said it changed its 20-year-old moniker to reflect its representation of nontransportation companies involved with EDI.

. . . . . .

Errico adds Price Waterhouse to team

Computer-aided software engineering market newcomer **Errico Technologies, Inc.**, which signed on software player Boole & Babbage, Inc. to handle worldwide distribution for its recently released AMS/Team product line, closed out the month of September with another prime contract. Big Eight accounting firm Price Waterhouse will be providing training, installation and implementation services for the Errico line, which among other features claims reverse-engineering capability.

EXECUTIVE CORNER

Ashton-Tate Corp. announced the promotion of two members of the company's management team. **Peter Boot**, 46, has been promoted to vice-president of the international division, and **Robert Kimball**, 32, assumes the post of director of product management for decision support products.

Multiflow Computer, Inc. has appointed **Robert Nix** as vice-president of product marketing, **Chani Pangali** as corporate director of technical services and support and **Michael Saylor** as director of operations.

Nix was director of operating system development at Multiflow before being promoted to his new position. Pangali most recently was director of applications software, benchmarking and strategic planning at Cydrome in Milpitas, Calif. Saylor joins Multiflow from Prime Computer, Inc., where he served in a number of senior field sales management positions of increasing responsibility.

Harry B. DeMaio, after a 30-year career at IBM, was named national manager of information protection services in the management consulting group at Deloitte Haskins & Sells.

DeMaio's most recent position at IBM was corporate director of data security programs.

Borland International announced that **Stephen J. Kahn** has joined the company as vice-president of marketing. Borland also announced the addition of **Stephen M. Green** as director of business development.

Kahn, 39 — no relation to Borland Chairman, President and Chief Executive Officer Philippe Kahn — comes to the company after serving as a director of special projects for Lotus Development Corp. Prior to joining Borland, Green, 35, was with Microsoft Corp., where he was manager, Southwest region for the OEM Group and then manager, developer relations group for systems software.

JOBTRAC™

PRODUCTION CONTROL AUTOMATION

Today's Answer To Tonight's Problems.

Unparalleled ISPF Dialogue Productivity • On-Line Run Documentation
Forecasting & Simulation On-Line • Installation in Hours, Not Days • Operator Command Scheduling
No Dedicated Hardware or JCL Changes • Distributed Processing to up to 256 Separate Locations
Complete Dependency and Event Triggering • Sysout Capture and Archival Included
Automatic Operator Facility Provides Programmable Message Reply
Automatic Date Card and Override Generation • Free 30 Day Trial

Bennett Software, Inc. 1-800-JOBTRAC P.O. Box 96694 • Houston, Texas 77213

"Welcome to Biddle Barter and Troll, where we all share success and one copy of Computerworld."

While sharing success is admirable, sharing COMPUTERWORLD is not.

Because when a magazine is meant to be pored over and referred to, it's meant to be kept close at hand.

The solution?
Your own subscription.

You can have a personal subscription to COMPUTERWORLD. All yours. Every week.

It will give you a complete rundown of everything that's happening in the computing arena — a macro package at a micro price. You'll stay on top of the news and nuances of the industry. And the praises and problems of its products.

In fact, with COMPUTERWORLD in your hand, you'll have the best possible grip on your field.

Bonus issues of COMPUTERWORLD FOCUS free.

Order your own subscription to COMPUTERWORLD today. You'll get 51 information-packed issues. Plus bonus issues of COMPUTERWORLD FOCUS — absolutely FREE. So in addition to getting the weekly news of the computer community, you'll get an in-depth exploration of its most timely topics. Topics that include communications, data security, networking, PC's, and more.

Plus you'll get our special Spotlight section . . . featuring detailed head-to-head comparisons of the industry's latest products.

So order now. Use the postage paid subscription card bound into this issue and get your own subscription. Because the people who share success aren't the ones sharing COMPUTERWORLD.

COMPUTERWORLD

375 Cochituate Road, Framingham, MA 01701

MSI blocks

FROM PAGE 109

drag MSI kicking and screaming down the aisle, and with sweetened terms: hours after MSI's coy announcement of negotiations with a white knight was released on the news wire, Telxon upped its offer to $20. Then came Symbol.

Will the Symbol announcement turn back Telxon? "I guess at $17 or even $20 a share, we don't look very attractive right now," a Telxon spokeswoman said. "Whether we will up our offer and enter a bidding war is something we just don't know yet."

Keeping score

Between the courtship and the court action, the MSI-Telxon relationship is beginning to require a scorecard to keep track of everything:

- In 1985, Telxon, which had then outstripped MSI in the handheld computer market, sued MSI in Ohio federal court, charging theft of confidential information. The suit, in which Telxon asks for $100 million in punitive damages, is scheduled for trial next month.
- MSI fired back; its lawsuit, brought in California district court, charged Telxon with infringement of certain patents for bar-code readers that can attach to mainframes.
- Last month, Telxon made an unsolicited tender offer to acquire MSI for $17 per share [CW, Sept. 19]. MSI Pesident Charles S. Strauch fired off a letter to the company's stockholders urging them not to jump at the Telxon offer.

Last week, the stakes escalated on all counts. First, MSI filed a counterclaim against Telxon in federal court in Delaware.

Among the list of allegations was the charge that Telxon's pursuit of MSI — motivated, according to Telxon, by the desire to build an invincible entry into the bar-code-reader market — was actually a ploy intended to shield the larger company from possible damage exposure in case of a loss on the patent issue while simultaneously gaining free access to the very MSI technology that MSI says Telxon has taken.

"Their allegations are totally unfounded," Telxon's Veatch said. "We will fight vigorously." Early last week, Telxon filed its counter to the counterclaim.

Meanwhile, in a letter addressed to MSI's board of directors, Telxon President Raymond Meyo expressed disappointment "that you have refused to respond to my numerous requests to negotiate and that you have continued to deny us access to the same information you have been providing to third parties considering an acquisition of MSI."

Meyo also chided the MSI board for giving its consistently spurned suitor a mere two hours' notice of an MSI board meeting.

"This is no way to run a fair auction with a level playing field," he wrote.

Even if Telxon prevails in its takeover attempt, some observers speculated that relationships between the companies could prohibit the successful formation of a single superplayer in the handheld computer market, locking the firms instead into a state of unholy deadlock.

Symbol, meanwhile, has hedged its bets: Under the terms of its agreement with MSI, Symbol will get $6 million "if the merger is not consummated under certain circumstances generally involving alternative acquisition transactions involving MSI," plus possible expense reimbursement.

Young-minded

FROM PAGE 109

personal computers and communications products.

"He and Kaspar Cassani got fancier titles but less responsibility," Djurdjevic said.

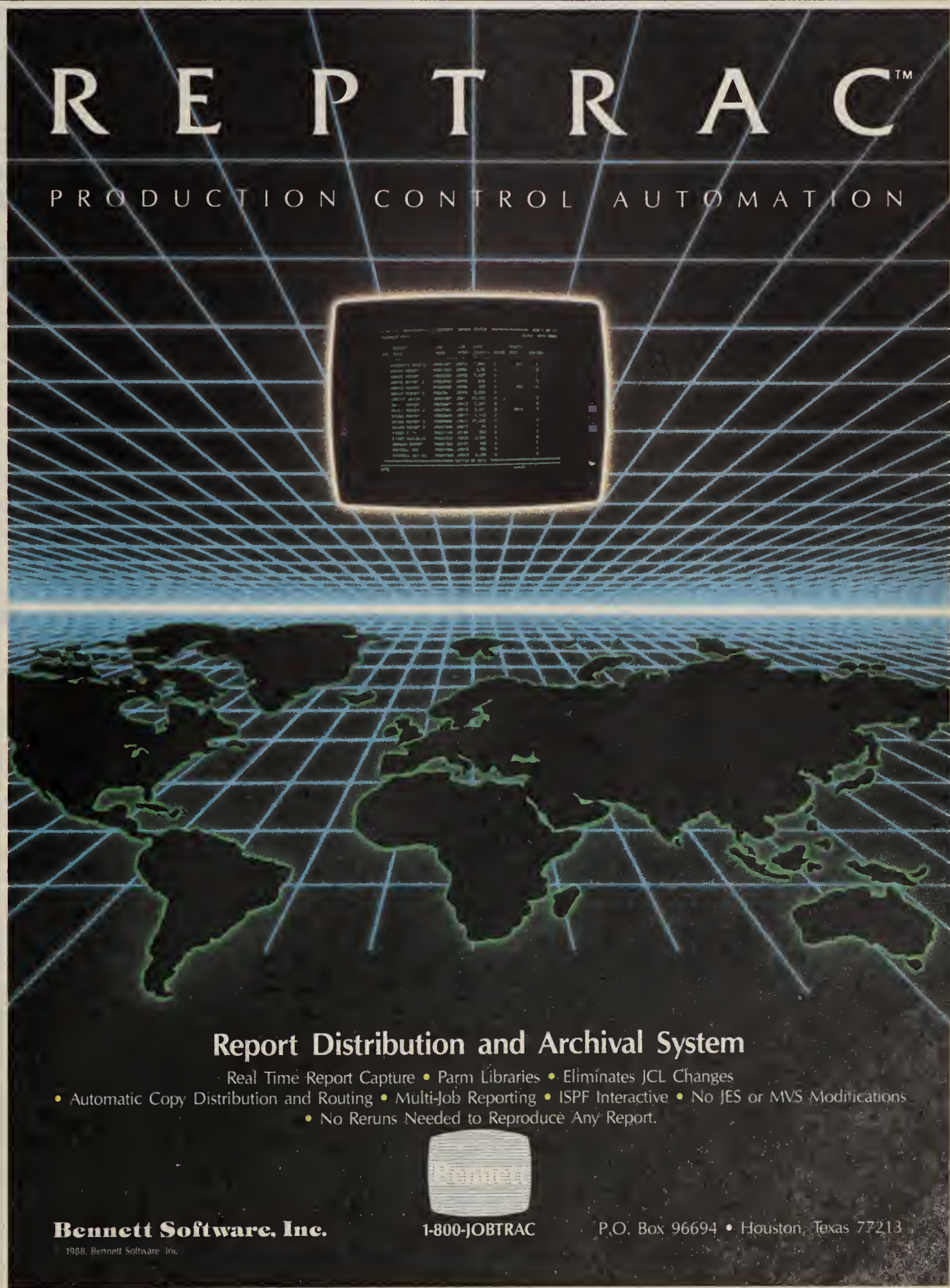
Krowe's move to Texaco is not as far removed from IBM as it would appear. Not only is the oil giant based in nearby White Plains, N.Y., but its board includes former IBM Chairman Frank T. Cary and current IBM board member Thomas Murphy, chairman of Capital Cities/ABC, Inc.

> "I FEEL YOUNG and feel that I can make vital contributions until the middle of the next decade."
>
> ALLEN J. KROWE
> FORMER IBM EXECUTIVE

Krowe said it was a "bittersweet choice" to leave IBM, which he said was "populated by the finest group of human beings imaginable. This [Texaco] opportunity came along 18 to 24 months sooner than I would have liked, but opportunities match their own schedules — not mine," he said.

In other executive moves last week, IBM promoted Systems Products Division President Edward J. Kfoury to corporate vice-president and named two new members to the board of directors. The new directors are Edgar S. Woolard, president, chief executive officer and chairman-elect of Du Pont Co., and John Brooks Slaughter, president of Occidental College in Los Angeles.

Also last week, IBM announced its third stock buyback plan in as many years. The firm will purchase close to $2 billion of its shares.



AS/400 demands new expertise

IBM's mid-range system shifts skill spotlight to RPG III, perhaps Cobol

BY ALAN RADDING
SPECIAL TO CW

The introduction of the IBM Application System/400 has extended career paths for some programmers who work in the IBM System/36 and 38 environments, just as it has established the upgrade path for users. But the warm reception given the new product line will not necessarily boost demand for IBM mid-range programmers.

Industry analysts see the initial conversion to the AS/400 taking place during the next two years. At this early stage, the following trends are already clear:

- Many shops plan to migrate to the AS/400 without any additional programming help; demand for System/36 and 38 programmers remains strong, however.
- RPG II programmers will either have to upgrade their skills or remain in a contracting System/36 world; RPG III programmers are positioned to move ahead but may also want to broaden their skills.
- AS/400 shops might require less support than System/36 or 38 shops; initially, the most dynamic opportunities will be with software and consulting firms.

In a nationwide survey by Focus Research Systems, Inc. in West Hartford, Conn., 70% of the AS/400 sites said they plan to port all their existing System/36 and 38 applications to the new system. Another 6% plan to port three-quarters of their existing applications.

Furthermore, most of those data processing managers expect the conversion to be completed in less than 30 days using their existing programming staff. Although the DP managers are skeptical that the migration will be as easy as IBM has promised, they clearly are not planning to staff up for a major software conversion effort.

Texans need not apply

In Texas, AS/400 buyers use the RPG III programmers they already have on staff for the conversion, says Pam Holden, managing director of Source EDP in Houston. "Most shops are just upgrading, so there isn't the demand for new people," Holden says.

But that approach doesn't mean the demand for RPG II and RPG III programmers is light. Because of turnover among the huge installed System/36 and 38 base, there continue to be many openings.

"I wish I could get a lot more 38 programmers," says Dave Flansbaum, managing director of Source EDP in San Francisco. The demand for System/38 programmers is strong despite the reluctance of DP shops to rush over to the AS/400, he says.

In both Texas and Northern California, the demand for System/38 programmers has not filtered down to System/36 programmers, the recruiters say. But Robert Sutherland, president of Common, a Chicago-based international IBM users group, says there is a great demand for good System/36 programmers and a short supply of them, particularly among consulting organizations.

The AS/400 is highlighting the diverging career paths for System/36 and 38 personnel. System/36 programmers are scrambling to upgrade their skills, Sutherland says.

"It's no surprise. The AS/400 has diminished RPG II skills. Anybody in the RPG II environment is sitting on a dead horse," says Bert Frederickson, president of EDS Computer Services, Inc., a custom-software house based in Marlboro, Mass.

Frederickson currently employs 10 RPG programmers, of whom only three are experienced with RPG III. He is hiring more, but he also intends to train his RPG II programmers in RPG III so he will be well-staffed to handle the AS/400.

The introduction of the AS/400 is driving up salaries for those few RPG III programmers who have training on the AS/400, but employers willing to help RPG II programmers upgrade their skills are finding "a good supply of people willing to accept lesser pay for the opportunity to get onto a new track," Frederickson says.

Tongue tweaking

Brian Hoffman, vice-president of MIS recruiting at Winter, Wyman & Co. in Waltham, Mass., recommends that even RPG III programmers upgrade their skills if they expect to advance in the AS/400 world. "We see the AS/400 platform supporting multiple languages. Within the AS/400 world, we expect to see a migration to Cobol," he notes.

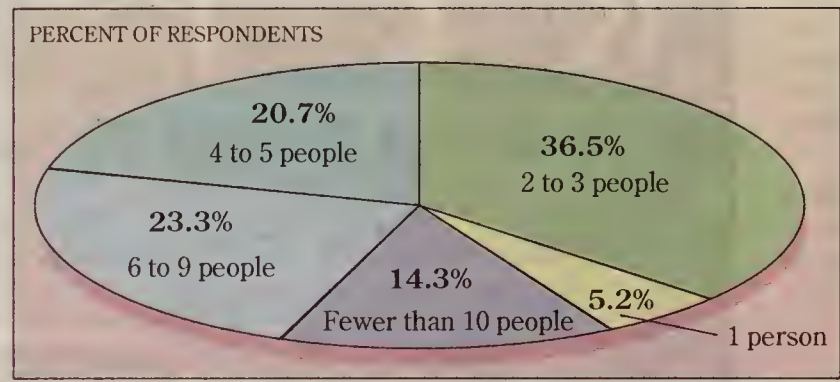
David Turner, vice-president of the MIS division at L.A. Silver Associates, Inc., a recruitment firm based in Framingham, Mass., expects the AS/400 to require fewer support people than the System/38. He recommends that RPG III programmers explore opportunities at the commercial software houses and consulting firms that serve the System/36 and 38 and AS/400 market.

RPG III programmers with two to three years of experience generally earn more than $30,000, says Winter Wyman's Hoffman. Software developers and consultants will pay considerably more if the programmer is experienced in product development and custom work. RPG II programmers rarely reach $30,000 and must upgrade their skills to break through that barrier.

Radding is a Boston-based author specializing in business and technology.

Conversion crews

Most DP managers surveyed at 95 companies expect to convert applications for an IBM AS/400 with five or fewer people



SOURCE: FOCUS RESEARCH SYSTEMS, INC.
CW CHART

News International Newspapers Limited

THE TIMES • NEWS OF THE WORLD • THE SUN • THE SUNDAY TIMES

Manager, Atex Services Department

$55,000+ and car London, England

News International Newspapers Limited who publish The Sun, News of the World, The Times and Sunday Times are seeking a Manager for their Atex Services Department based in London.

The Job:

This is a senior appointment within the Company and the successful applicant will be responsoble for:

- managing and controlling the technical and administrative functions of the Atex Services Department;
- formulating an E.D.P. strategy;
- setting down plans for the strategic demands of computer applications and the associated technical services and the support systems activity across all copy processing.

The Person:

Suitable candidates will be able to demonstrate considerable experience in computerized newspaper production, preferably using an Atex system. A thorough knowledge of the way in which editorial and advertising departments run is essential.

The Rewards:

Starting salary will be negotiable but not less than $55,000 per annum and a Company car will be provided. There are six weeks annual holiday plus the usual Bank holidays. The Company operates a non-contributory Health Plan. Pension scheme is available.

Letters of applications accompanied by a comprehensive resume should be sent airmail to:

Tudor Hopkins, Director of Human Resources
News International Newspapers Limited
P.O. Box 481, Virginia Street
London E1 9BD, England

CICS/IMS/VSAM made easy!

Now, build your DP skills . . . and bypass months—even years—of heavy on-the-job experience. DP Series handbooks help you overcome programming/analysis problems and make easy work of mastering CICS/IMS/VSAM in record time. More than 35,000 DP pros have chosen our DP Series handbooks over others. Act now and order your copies today! You must be satisfied or your money back at any time.

CICS/VS Command Level Programming with COBOL Examples **By David Lee $31.95**
16,000 CICS programmers turn here for quick, reliable answers. You get 273 fully worked-out examples, plus 15 major CICS applications, each demonstrated by a sample CICS program. CICS mapset coding, Production Abend Handling, Online report printing, Pseudo Conversational CICS program design, coding, testing and implementation, and much more!

CICS/VS Online System Design and Implementation Techniques **By David Lee $31.95**
Gain 3 years solid CICS experience—in just a few months! Get step-by-step coverage of CICS advanced features . . . design, testing, and implementation methods . . . solutions to 100 most common application problems . . . and design and programming of 15 major CICS applications.

IMS/VS DB/DC Online Programing Using MFS and DL/I **By David Lee $31.95**
Discover why 6,000 IMS DB/DC programmers—and AT&T—use this guide daily to simplify work-day tasks. Bursting with 245 practical examples, plus 9 major IMS DB/DC applications . . . this time-saver is all the online programming help you'll ever need.

IMS/VS DL/I Programming with COBOL Examples **By David Lee $31.95**
Stock up on DL/I data base and DL/I batch programming know-how. 212 practical examples. DL/I JCL setup, DL/I calls usage, Data Base access methods, DBDGEN and PSBGEN utility usage, Data Base load, Logical Data Base and Secondary Index Design and Processing, and more!

VSAM Coding in COBOL and VSAM AMS **By David Lee $31.95**
Become a VSAM expert in 1 month! You'll get 14 major VSAM applications in COBOL, plus 53 AMS examples covering VSAM file creation and maintenance. Worked-out COBOL examples and OS/MVS and DOS/VSE JCL on VSAM files save you hours of work.

To order by VISA or M/C, call our TOLL FREE number below. Or send a check for the books you order (add 6.5% state tax if California resident) plus shipping & handling ($3 for 1st copy and $1 for each additional copy up to 5 copies). Most orders shipped within 24 hours via UPS.

CCD Online Systems, Inc.
9440 Telstar Ave., Suite 201
El Monte, CA 91731
Toll Free 1-800-282-1019 (9-5 Pacific Time)

S O F T W A R E
S P E C I A L I S T S

Now is the time

Challenging opportunities exist for experienced Technical Professionals in our Customer Support Center in Colorado Springs.

We are looking for professionals who have superb communication skills—who thrive in a customer support setting—to consult with our customers on a one-to-one basis. You should be able to work as an active team member while researching and structuring innovative solutions to complex software problems.

We are looking for qualified applicants with a degree in Computer Science and/or the equivalent experience specific to the following disciplines:

VAX/VMS* Support

You must have 2 or more years experience with VMS as a system manager or from a strong user level support role.

Network Support

You must have 2 or more years experience with one of the following Digital Networks and Communications products:

- DECnet,* VAX* and/or DECnet RSX*
- Ethernet Technology
- Ethernet Terminal Servers
- DECserver 100/200*

VAX Information Architecture

Experience in applications design and programming, database design, implementation and maintenance and/or forms management. In-depth knowledge of VIA products such as DTR32, DBMS, Rdb/VMS,* TDMS, ACMS, RALLY, CDD and FMS is preferred.

For immediate consideration, please send your resume to: Ms. Barbara Cusack, Dept. 1003 8804, Digital Equipment Corporation, 305 Rockrimmon Blvd. South, Colorado Springs, CO 80919.

We are an affirmative action employer.

*Trademarks of Digital Equipment Corporation

Digital has it now.

digital™

CP&L: Where The Right Environments Come Together

Immediate Opportunities In Applications Development

Consider what you want from your career and then picture an ideal lifestyle. If you could have the right environment for both, your next career move would be an easy one. With CAROLINA POWER & LIGHT COMPANY, a major force in Southeastern power generation and distribution, the personal and professional environments come together to provide an excellent base for long-term satisfaction.

Let's examine our state-of-the-art technological environment first. Along with wide use of personal computers, we're operating two IBM 3090-200's, one IBM 3083J, one Amdahl 5860, and one Amdahl 5870. The CICS on-line environment has been growing at the rate of 40% per year. Recently we have expanded to a new Data Center. We're operating under MVS/XA and VM/CMS utilizing an SNA/SDLC network consisting of over 3,000 terminals and printers. Our programming languages are COBOL and DATACOM's IDEAL. We have a growing Information Center environment and are aggressively pursuing end-user computing and office automation technologies.

Now, about personal lifestyle. With CP&L in the beautiful Carolinas, your leisure time can take place in the mountains or on the seashore—or in many great areas in between. Year-round, we enjoy a mild but seasonal climate and a wide variety of recreational and cultural events. The area has a moderate cost-of-living, excellent schools and fine housing.

We have recently completed a large strategic planning study and have a significant backlog of technical and application development projects. We are in transition from a largely maintenance mode to an aggressive development mode. We are seeking talented individuals for the following:

SYSTEMS ANALYSTS & DB ANALYSTS

5-plus years experience in a development environment versus a maintenance environment. Highly desired experience would include: Structured analysis techniques; Relational Data Modeling; DATACOM/DB; On-line real-time systems; Arthur Andersen's Method/1; Prototyping; Application Generators.

PROGRAMMERS

1-5 years structured coding experience in a development environment versus a maintenance environment. Highly desired experience would include: DATACOM; COBOL; IDEAL; CICS.

CP&L offers competitive salaries, excellent benefits, and opportunities to advance. If interested in becoming part of our important team of professionals, send resume with salary requirements to: **Susie Brown, Recruitment Representative, Dept. CW103, CAROLINA POWER & LIGHT COMPANY, P.O. Box 1551, Raleigh, NC 27602.** An Equal Opportunity/Affirmative Action Employer

CP&L
Carolina Power & Light Company
Energy In Operation

ACT

VICE PRESIDENT

ACT Information Systems Division

The American College Testing Program (ACT) is seeking an experienced professional to direct division responsible for information processing activities to support research, test development, and delivery of assessment programs. Position located in firm's headquarters in Iowa City, Iowa.

Requirements include graduate degree in computer science or related area, senior-level experience in the field, or equivalent combination of experience and education. Experience must include (1) acquisition, design, development, and maintenance of data/text processing systems and (2) managing staff and information processing operations. Must have knowledge of relational data base technology, large scale application systems, and communication systems.

Competitive salary and benefit program. Good work environment. To apply, send letter of application and resume (including summary of education and training, employment history, salary requirements, and references) to Personnel Services, ACT National Office, 2201 North Dodge Street, P.O. Box 168, Iowa City, Iowa 52243. Application deadline is October 25, 1988.

ACT is a nonprofit organization providing educational measurement and research services to colleges, high schools, government agencies, and professional associations.

ACT is an Equal Opportunity/
Affirmative Action Employer

HELP WANTED:

Senior System Software Engineer

Please send resume within 30 days of publication date to:

Employment Security Dept.
Es Division, Att: AEC # 90049-K
OLYMPIA, WASHINGTON 98504

JOB DESCRIPTION: Senior System Software Engineer, OS/2 Group. Designs, implements, and tests complex and high level systems and software for microcomputers and processors. Assumes lead responsibility to design OS/2 operating system software utilizing "C" and 86 Assembler Series languages to operate on 386-based microcomputer and IBM/AT computers. Designs operating system to virtualize hardware for individual DOS applications.

REQUIREMENTS: M.A. or M.S. in mathematics, computer science, engineering or physics. Computer software design or programming: 6 months' employment experience utilizing MS-DOS or OS/2 operating system, "C" and 86 Assembler series languages, 386-Based Microcomputers and IBM/AT computers, and designing peripheral components of microprocessors.

SALARY: $33,500 per annum. 40 hours per week, flex time.

Position located in Redmond Washington.

EOE

SENIOR RESEARCH SCIENTIST for computing corporation in South Eastern Minnesota engaged in research and development of Advanced computer software and hardware for geometric modeling. Will participate in development of engineering applications products based on company's proprietary geometric modeling technology: specific responsibilities include participation specification, design and development of the core modeling system, user-interface, graphics, kinematic and dynamic analysis, with a view towards implementation on parallel hardware; in-depth research into design of efficient algorithms, fault tolerance, distributed systems, database systems, programming languages and computer graphics. Must be able to program in LISP, C AND Fortran languages. Requires Ph.D. in Computer Science with (1) one year of experience in the job described. Experience may have been gained as part of an academic program or in an industrial environment. Must also have completed at least 5 courses in Mechanical Engineering.

Salary: $45,000 per year for a forty hour week. Interested applicants send resume to: R. Tibbetts, #8-95, Minnesota Department of Jobs and Training, 390 North Robert Street, St. Paul, MN 55101

HEALTHCARE DEBT COLLECTION SALES

We are a growing Inc. 500, IBM S/36, S/38 and AS/400 Value Added Remarketer (VAR) specializing in AR Recovery and Bad Debt Collection Solution selling. We can offer you a choice of multi-state territory, fast track to sales management, base salary, incentives, accelerators, options and fun. You must be a quota breaker with Healthcare Financial Solution Selling experience. Please contact Ed Robinson, Dexel Systems Corporation (703) 448-9400 for additional information.

CA & AZ CONTRACTS

CONSULTANTS WANTED

P. Murphy & Associates, Inc.
10000 RIVERSIDE DR., NO. 5
LOS ANGELES, CA 91602
818/508-8474 714/552-0506

SIEMENS

Product Manager - Radiotherapy Information Systems

Siemens Medical Laboratories, is a successful affiliate of the multi-national Siemens AG. We have an immediate opening for a seasoned Product Manager for our line of Mevamatic™ record and verify systems for our medical linear accelerators which are used to treat cancer.

In this position, you will manage existing products; maintain product configuration and documentation, provide installation/operating procedures and ensure order accuracy; review literature, investigate technical papers, publications; update/create manuals and ensure cost effective product development. You will also be the liaison between customers and field personnel.

The successful candidate will have a four year technical degree (BSCS, BSEE, or BA, Physics), five years experience with DEC PDP systems running under RSX/others; excellent customer relations skills and experience in sales, product applications or other marketing related activities. Prior computer-based medical product management experience is preferred, with an understanding of radiotherapy. German language skills are a plus.

We offer competitive salaries and a comprehensive benefits package which includes company paid medical and life coverage, plus retirement and savings plans.

To apply, please send your resume to:

Personnel Department
SIEMENS MEDICAL LABORATORIES, INC.
2404 N. Main Street
Walnut Creek, CA 94596

An Equal Opportunity Employer M/F/H

DATA PROCESSING PROFESSIONALS

We speak your language!

Yes, there are recruitment people who know the workings of the computer field, who concentrate on understanding your needs...and filling them.

Through our national network, these specialists can scour the country to find the one best candidate for your company's opening. If you hire at the middle management or executive level in the computer field, get to know us better.

Independently owned and operated offices in major cities. For the office specializing in your area, call toll free: (800) 221-4864. (In NY State, call 212-697-4314.)

Fortune Personnel Consultants

PROJECT SYSTEMS ANALYST

A progressive enamel coated paper manufacturer located in Central Wisconsin has an opening for an experienced Systems Analyst. This person, reporting to the Special Projects Manager, will develop and implement computer systems to meet the information processing needs of user departments. Both routine and moderately complex projects would be carried out. This individual will completely develop systems from initial contact with end-users through final implementation of finished product using 4th generation application generators. This includes all analytical and development work. Knowledge of large IBM mainframes, associated software usage and JCL required.

Bachelor's degree in computer science, math, or business administration and at least 3 years of systems analyst experience. Knowledge of data base usage would be helpful, and a knowledge of ADR Datacom DB and IDEAL would be helpful, but not mandatory.

Excellent employee benefits, liberal relocation program. Send resume and salary requirements to:

Bert E. Johnson
Professional Employment Manager
CONSOLIDATED PAPERS, INC.
P.O. Box 8050
Wisconsin Rapids, WI 54495-8050
An Equal Opportunity Employer M/F/H/V

Consolidated

The National Project Center
For National Contract Assignments

Put Your Skills To Work Today! Call: 1-800-777-5999

If you are an expert in any of the following areas, explore your options:

Hundreds of national assignments are now available with just one call. Choose your location and enjoy the security of an active career that combines rewarding state-of-the-art projects with the option of travel and adventure.

SNA/SDLC/X.25/INTEL	
ADABAS/NATURAL ver 2	
DATACOM/IDEAL	UCCEL
S/38 RPG-III	IMS DB/DC
VAX/VMS SYSTEMS	CICS/IMS/PL1
PROGRAMMER	DB2/SQL
IBM PC, "C",	IMS DBA
DEVICE DRIVERS	FOCUS

The Experts
NATIONAL PROJECT CENTER
4401 W. Tradewinds Ave. #302
Lauderdale by the Sea, FL 33308

UNIVERSITY OF MASSACHUSETTS AT AMHERST

STAFF ASSOCIATE/MANAGER OF SYSTEMS & NETWORKING

The University Computing Center, University of Massachusetts is looking for a Manager of Systems & Networking to be responsible for mainframe operating systems and data communications software. Candidates should possess a Master's Degree in Computer Science or equivalent experience. Position requires knowledge of computer systems, advanced analysis and design techniques. Systems programmed and network development experience is desired. Position has management responsibility for Control Data and DEC VAX systems and for 5 systems analysts. Hiring Salary Range: $30,000 - $40,000 (normal starting range: $30,000 - $35,000). Send resume with names of 3 references to: Judith A. Smith, University Computing Center, University of Massachusetts, Lederle Graduate Research Center, Amherst, MA 01003. Deadline: October 17, 1988. An Affirmative Action/Equal Opportunity Employer.

MANAGER OF SYSTEMS SERVICES

The Department of Civil Engineering of the University of Illinois at Urbana seeks a full time Manager of Systems Services for the Department's network of engineering workstations (Apollo) plus other computer equipment for support of research and teaching. Masters degree plus 3-year's experience in network-based operation or equivalent required. Network applications include numerical simulation, 3-D graphics, statistical analysis, expert systems and electronic publishing.

This manager will supervise student employees and assist with software installation, short course instruction, and consulting with users. Applicants should have a knowledge of workstation computing, the Unix or Aegis operating system, communications protocols, and a scientific programming language.

To insure full consideration, applications for appointments beginning January 6, 1989 or thereafter must be received by November 1, 1988. Salary approx. $30,000-42,000/yr.

Resumes should be addressed to:

Professor W. J. Hall, Head
Department of Civil Engineering
1114 Newmark Lab, MC-250
University of Illinois at Urbana
205 N. Mathews Avenue
Urbana, IL 61801
Tel: (217/333-3927)

The University of Illinois at Urbana-Champaign is an Affirmative Action/Equal Opportunity Employer.

ATLANTA & SOUTHEAST
$25,000 to $65,000
IDMS/ORACLE/DATACOM/IMS/DB2/SYS 38
VAX/MAPICS/FOCUS/CAD/CAM/CAE
TECHWRITERS/DP SALES/IDMS

Need Programmers, Programmer/Analysts for Full-Time and Consulting Positions in IBM Shops. Relocation Expenses Paid. Send resume to:

Jim Heard, EDP Consultants, Inc.
3067 Bunker Hill Road, Suite 202
Marietta, Georgia 30062

FAX: 404-973-4052 **PHONE: 404-971-7281**

IT'S CALLED THE GOLDEN GATE FOR GOOD REASON

Systems professionals can discover career enrichment and personal satisfaction through the rewarding positions available with our prestigious clients. Logical Options and Sanderson Associates have merged forming Northern California's premier Search Firm

THE SEARCH FIRM, INC.
595 MARKET STREET, SUITE 1400, SAN FRANCISCO, CA 94105
(415) 777-3900 FAX 777-8632

Systems Engineer - Application development on user interface processing for a large network management system using client/server architecture & object oriented design principles. Duties include requirements decomposition design, code inspection & systems test. Applicant will use and is knowledgable in Unix V Internals, IPC & Network Protocols, with advanced C programming, & X Window System. Mainframe relational database, P.C. Video, BIOS, EGA graphic programming & LAN are also required, plus strong technical writing skills & problem solving skills. Master of Science Degree required. Salary - $36,500 annually. Hours: 8:00 a.m. to 5:00 p.m., Monday thru Friday. Apply by Resume to Colorado Division of Employment & Training, 600 Grant Street, Suite 900, Denver, Colorado 80203-3528, and refer to Order No. CO2918092.

FLORIDA

P/A CICS/DB	34-38K
P/A S/38, MFG.	35-40K
S/P VSE	40-45K
S/P MVS/CICS	40-60K
S/E X.25, SNA, SCADA	to 50K
DBA ADR or DB2	45-55K

PRO-TECH
1300 E. Hillsboro Blvd.
Suite 202
Deerfield Beach, FL 33441
(305) 421-2734

Now... you can recruit the right people in the right places at the right price.

With the new IDG Communications Computer Careers Network, you can run the most targeted and cost-efficient recruitment program possible. You simply choose the combination of eight leading newspapers - **Computerworld, InfoWorld, Network World, Digital News, Federal Computer Week,** and **Computer Currents**/ Northern California, Southern California, and Boston editions - that's right for you.

For all the facts on putting the Computer Careers Network to work for you - regionally or nationally - call the sales office nearest you. Or contact John Corrigan, Recruitment Advertising Sales Director, at 508-879-0700.

Sales Offices:

BOSTON: 375 Cochituate Road, Box 9171, Framingham, MA 01701-9171, (508) 879-0700;

NEW YORK: Paramus Plaza I, 140 Route 17 North, Paramus, NJ 07652, (201) 967-1350;

WASHINGTON: 3022 Javier Road, Suite 210, Fairfax, VA 22031, (703) 573-4115

CHICAGO: 10400 West Higgins Road, Suite 300, Rosemont, IL 60018, (312) 827-4433;

LOS ANGELES: 18004 Sky Park Circle, Suite 100, Irvine, CA 92714, (714) 250-0164;

SAN FRANCISCO: 18004 Sky Park Circle, Suite 100, Irvine, CA 92714, (714) 250-0164

It's the efficient way to recruit qualified computer professionals.

Now you can target your recruitment advertising to the qualified computer professionals you want to reach - where you want to reach them. All you need is the new IDG Communications Computer Careers Network. Here's how it can work for you:

You choose the newspapers. Depending on who you're looking for, you can select the combination of eight newspapers that best suits your needs - **Computerworld, InfoWorld, Network World, Digital News, Federal Computer Week,** and **Computer Currents**/Northern California, Southern California, Boston and Washington, D.C. Editions.

You choose the region. If you wish to recruit within a specific area, you can advertise in the regional editions of the newspapers you choose - East, West, or Midwest. Of course, national buys of individual newspapers or various combinations are also available when you need to extend your reach.

You don't pay for readers you don't want. Gone are the days when you have to worry about paying for waste circulation. The Computer Careers Network puts you in touch with qualified computer professionals - and only those qualified computer professionals you need to reach.

To put the new Computer Careers Network to work for you - regionally or nationally - call the sales office nearest you. Or contact John Corrigan, Recruitment Advertising Director, at 508-879-0700. And if you hurry, you can still get in on the special low introductory offer.

Sales Offices

John Corrigan, Recruitment Advertising Sales Director, 375 Cochituate Road, Box 9171, Framingham, MA 01701-9171; 508-879-0700.

BOSTON: 375 Cochituate Road, Box 9171, Framingham, MA 01701-9171, Al DeMille, Regional Manager, Nancy Percival, Account Executive; 800-343-6474. (in Massachusetts, 508-879-0700).

NEW YORK: Paramus Plaza I, 140 Route 17 North, Paramus, NJ 07652; Warren Kolber, Regional Manager, 201-967-1350; Jay Novack, Account Executive 800-343-6474.

WASHINGTON, D.C.: 3022 Javier Road, Suite 210, Fairfax, VA 22031; Katie Kress, Regional Manager, 703-573-4115; Pauline Smith, Account Executive 800-343-6474.

CHICAGO: 10400 West Higgins Road, Suite 300, Rosemont, IL 60018; Patricia Powers, Regional Manager, 312-827-4433; Ellen Casey, Account Exective 800-343-6474.

LOS ANGELES: 18004 Sky Park Circle, Suite 100, Irvine, CA 92714; Barbara Murphy, Regional Manager, 714-250-0164; Chris Glenn, Account Executive, 800-343-6474.

SAN FRANCISCO: 18004 Sky Park Circle, Suite 100, Irvine, CA 92714; Barbara Murphy, Regional Manager, 714-250-0164; Chris Glenn, Account Executive, 800-343-6474.

COMPUTERWORLD's COMPUTER CAREERS!

As the industry grows, so will **COMPUTERWORLD.** This is not a phrase we took lightly. We will continue to offer the high quality news coverage and editorial content that has attracted our readers since our beginning. But we also must continue to grow. What does that mean to you, our advertisers? Good news...in the form of wide exposure. We offer a feature topic to each weeks Recruitment ads. This allows for us to target your specific market. In addition to the attractive format, it is easy to read. We offer a variety of topics which we have listed below:

OCT

10/10	Career Effects of Fully Automated DP Shops
10/17	Outlook for DEC Experts
10/24	Jobs in Federal Government
10/31	Demand for Unix Experts

NOV.

11/7	Network Management Careers
11/14	Outlook for MIS/DP Teaching Jobs
11/21	Opportunities in PC Applications Development
11/28	Retail Industry Career Prospects

DEC

12/5	Demand for Communications Pros
12/12	Jobs in Consulting
12/19	Opportunities in Geographic Information Systems

JAN '89

1/2	'89 Employment Outlook

So, as a nationwide publication, we give you the exposure you want. As a weekly publication, we give you the immediacy your advertisements need.

COMPUTERWORLD publishes every Monday with an ad deadline of 10 days prior to each issue date. You may send in copy to be pubset or camera-ready material (velox or negative) via the mail. We provide telecopier service and will also take ads over the phone. We now have an answering machine which will take your calls/reservations even after business hours on the east coast. Please call either number listed below and indicate you would like Classified Advertising and you will be immediately connected to the machine. It's as easy as that!

Our mailing address is

COMPUTERWORLD

Classified Advertising

Box 9171

375 Cochituate Road

Framingham, MA

01701-9171

Or call for more information at

1-800-343-6474 or,

in Massachusetts, **(508) 879-0700**

Programming

TOYOTA QUALITY

IBM MVS/XA SYSTEMS PROGRAMMER

Toyota Motor Sales, U.S.A., the nation's leading auto importer, has a great opportunity available for a computer programmer in our Corporate Headquarters in Torrance, California.

The selected individual will develop Operating Systems software using MVS/XA and VM XA/SF. This position requires technical and leadership skills for such projects as VM, HSM, Internals, Performance, or Capacity Planning. Our computer complex (IBM 3090 and IBM 3081) is the U.S. Headquarters with worldwide links to other MVS Systems. A Bachelor's Degree is required.

If you seek the **Toyota** challenge, your expertise will be rewarded with a competitive salary and complete benefits program. Submit resume and salary history in confidence to:

Toyota Motor Sales, U.S.A.
Personnel Req. #21904
19001 S. Western Ave., A124
Torrance, CA 90509

Equal Opportunity Employer

COMPUTER CAREERS NETWORK

Now you can reach the qualified computer professionals you're looking for with Computer Careers Network.

Every week, the new IDG Communications Computer Careers Network of eight leading computer and communications newspapers delivers your recruitment advertising to an audience of highly qualified computer and communications professionals. When you put the proven, weekly authority of Computerworld and specialized readerships of InfoWorld, Network World, Digital News, Federal Computer Week, and three regional editions of Computer Currents to work for you, you get the best chance ever to target the qualified professionals you need to reach.

Select the publications you need to reach the talent you're looking for. Then target your audience by region. Or blanket the entire nation.

To put the Computer Careers Network to work for you, call the sales office nearest you today.

Sales Offices: John Corrigan, Recruitment Advertising Sales Director, 508-879-0700;

BOSTON: Al DeMille or Nancy Percival, 800-343-6474. (in Mass. 508-879-0700);

NEW YORK: Warren Kolber, 201-967-1350; Jay Novack, 800-343-6474.

WASHINGTON, D.C.: Katie Kress, 703-573-4115; Pauline Smith, 800-343-6474.

CHICAGO: Patricia Powers, 312-827-4433; Ellen Casey, 800-343-6474.

LOS ANGELES: Barbara Murphy, 714-250-0164; Chris Glenn, 800-343-6474.

SAN FRANCISCO: Barbara Murphy, 714-250-0164; Chris Glenn, 800-343-6474.

Systems Programmer

*A major communications company, headquartered in **Irvine, CA,** is seeking a senior Systems Programmer to install, maintain and tune its MVS/CICS systems.*

The position requires 2-3 years recent systems programming experience with MVS/CICS and related products along with superior written and verbal communication skills. A BSCS is helpful.

*For consideration, forward resume with cover letter and salary history to: **Box B5093, c/o Computerworld, 375 Cochituate Rd., Framingham, MA 01701.** An equal opportunity employer.*

DATA PROCESSING DIRECTOR
$62,180-$77,725/yr.
+ 8% mgmt. pkg.

City of Anaheim seeks DP Director to manage the City's data processing and management information functions.

We require experience managing, training and motivating a large EDP staff, as well as knowledge of systems analysis, PCs, programming and data processing operations, and fiscal management. Strong oral and written communications skills are also essential.

City applications accepted on a continuous basis until position is filled. First review date is Friday, 10/14/88. To apply, contact:

CITY OF ANAHEIM
200 S. Anaheim Bl. #332
Anaheim, CA 92805
(714) 999-5111 EOE/AA

Recruit qualified computer and communications professionals with the IDG Communications Computer Careers Network of eight leading computer newspapers.

Call

Lisa McGrath at:

(800) 343-6474

for more details

We Have The Data Processing Challenges You've Been Looking For!

If your background and qualifications have prepared you for a key role in a nationally-respected organization, consider Homedco. We're a leading provider of home medical equipment, and respiratory and infusion therapy products.

We're building a staff of talented professionals who will be responsible for developing a national branch office computer system utilizing 1,200 IBM PS/2s, 4th generation languages, 5th generation application code generators, and relational databases. If selected, you will also develop business applications including order processing, delivery, inventory tracking, billing/reimbursement and sales analysis.

Consider the following opportunities:

SYSTEMS MANAGER

This highly visible position requires a leader with proven ability to manage a team of professionals in developing our new national system. We require 8-10 years experience to include managing hardware and software vendors.

SR. SYSTEMS ANALYSTS

We require 5-7 years related technical/management experience, coupled with demonstrated ability to gather user requirements and design systems, plus manage several programmers. Additionally, this individual must be able to interface with all levels of company management.

SR. PROGRAMMER/ANALYST

This individual must have at least 5 years programming and analysis experience, preferably in a mainframe environment, plus hands-on experience with any data base management system and 4GL.

All positions require extensive systems development experience in a mainframe and/or PC based environment. In addition, the ideal candidates will be team players with strong organizational and communication skills.

We provide the kind of advantages you'd expect from an industry leader, including a highly competitive salary/benefits program as well as opportunities for personal and professional growth. For consideration, please submit a resume with salary history to: **Professional Staffing, Dept. EO-CW1088, Homedco, 17650 Newhope Street, Fountain Valley, CA 92708.**

Homedco

Equal Opportunity Employer/Principals Only, Please

EDT

Electronic Data Technologies, the world leader in gaming management systems, is looking for several managers and senior programmer analysts. Due to the rapid growth of the Company, we are seeking highly motivated individuals willing to work in an International marketplace with headquarters in Las Vegas. EDT is a publicly traded Corporation, located in the sunbelt of the Southwest. Our products are micro-computer based running the industry's leading software, hardware, and fiber optic communications.

MANAGER, HARDWARE DEVELOPMENT

5-10 years experience in a computer related discipline/organization. Direct supervisory/management experience including project and resource management. Must have proven ability to manage projects and personnel, to meet deadlines within approved budgets. Prefer degree in computer science, engineering, business or equivalent work experience. Must have PC, AT, PS/2, DOS, LAN and Token Ring Networking knowledge along with mechanical and electronic design experience.

SENIOR PROGRAMMER ANALYSTS

Minimum 4 years experience in a software development environment. Responsibilities include project and staff management, system design, development of IBM (PS2) microcomputer based software utilizing "C" programming language, DOS 3.3, large data bases, local area networks, gateways to main frames for collection of data on a real time basis. 4 year degree in computer science or equivalent work experience required. Assembly language experience would be a plus.

FIRMWARE PROGRAMMERS

Must be well organized, meticulous, full-time firmware programmer. Requirements: 8031 assembler in Real-Time Interrupt environment; knowledge of Digital/Analog circuits. Structured programming a MUST. Field Tech and "C" programming desirable.

Compensation includes profit sharing, insurance plans and tuition aid. Our rapid and continuing plans for expansion have created opportunities for the right individuals to join our established firm and grow with us.

Please submit your resume and salary history to:

ELECTRONIC DATA TECHNOLOGIES
3155 West Harmon Avenue, Suite A
Las Vegas, Nevada 89103
ATTN: Director of Engineering

Recruit qualified computer and communications professionals with the

IDG Communications Computer Careers Network of eight leading computer newspapers.

Call Lisa McGrath at:

(800) 343-6474

for more details.

KING FAHD UNIVERSITY OF PETROLEUM & MINERALS
Dhahran – Saudi Arabia

College of Industrial Management

announces faculty position openings September 1, 1989 for the ranks of professors, associate professors and assistant professors in MANAGEMENT INFORMATION SYSTEMS:

Computer concepts, business applications, systems analysis design and development, management support systems, data base systems, personal computers.

Applicants should have outstanding records in DBA or Ph.D. programs and strong potential and interest to do research and to develop teaching materials at the forefront of their fields.

The University offers attractive salary and benefits plus air conditioned furnished housing and air transportation to and from Dhahran each year. Ten months duty each year with two months vacation salary. Minimum regular contract for two years, renewable.

Apply before December 31, 1988, with complete resumé and supporting documents to:

Dean of Faculty & Personnel Affairs
KING FAHD UNIVERSITY OF PETROLEUM & MINERALS
Dept. No. CIM/610-02
DHAHRAN — 31261, SAUDI ARABIA

Research Programmer - (networking)

Brief Description of Position: Computer scientist/engineer needed to coordinate the implementation, upgrade, integration and operation of local and wide area network connections to national labs, universities, and corporate labs for high speed access to supercomputers. Position requires good technical understanding of computer networks, verbal and written communications skills and willingness to take initiative.

Qualifications: B.S. required in Computer Engineering, Computer Science, or related field. At least two years experience in networking with both hardware and software experience.

Conditions: This is a 12-month, 100%-time appointment (contingent upon receipt of funding) with regular University benefits. Salary commensurate with experience. Starting date negotiable.

To ensure full consideration, please send letter of application, resume, college transcripts, and three letters of reference by October 7, 1988 to:

Susan Vinson
National Center for Supercomputing Applications
152 Computing Applications Building
605 East Springfield Avenue
Champaign, Illinois 61820
217/244-1989

The University of Illinois is an Affirmative Action/ Equal Opportunity Employer

RESEARCHER AND INSTRUCTOR - Teach hardware & software computer courses to graduate & undergraduate students. Courses to include: Discrete Structures, Data Structure, C, PASCAL, MODULA II, ADA Languages. Teach operating systems, compilers, Advanced Computer Architecture & system analysis. Prepare & deliver lectures & seminars, assign homework & research projects & follow-up. Conduct research in Data Flow Architecture machine & a simulation language that is convenient & capable of modelling fuzzy systems. Background in digital logic design, computer organization & interfacing. Requires MS in Computer Science or MS in E.E. plus 3 years experience, 35 hours/week, $33,500/yr. Resume & refs. to: Dr. T.L. Teng, Computer Science Dept., New York Institute of Technology, Old Westbury, NY 11568.

EMS
Eastern Mountain Sports®

ANALYST/ PROGRAMMER

Eastern Mountain Sports, an exciting, progressive specialty retailer in it's 21st year, is looking for experienced Systems Analysts/ Programmers to join our MIS group.

The ideal candidate will have experience on the System/38 and experience with Retail Systems, Point-of-Sale, Merchandising, Marketing, Distribution, Payroll/ Human Resources and Numerical Forecasting.

EMS offers competitive Wages, unique benefits and an enjoyable working environment. This is a great opportunity for the right individual. For prompt confidential consideration, please forward your resume and salary requirements to:

Eastern Mountain Sports
Human Resources Department
One Vose Farm Road
Peterborough, N.H. 03458

FLORIDA

Unique consulting firm has multiple openings in Tampa and Orlando, Florida for qualified professionals with 2+ years experience in any of the following disciplines:

BAL	TECH WRITER
MRPII	EASYTRIEVE+
M-204	CICS/COMMAND
FOCUS	CICS/MACRO
TANDEM	MIIS/MUMPS
DB2/SQL	RPGIII/HEALTH
MAC-PAC	TELEPHONY
CICS/DL1	IMS DB/DC

Medicare/health insurance

To advance your career with a dynamic team send resume to:

CBA, Inc.
8814 Baypoint Drive
Suite D 104
Tampa, FL 33615-5326
(813) 886-1655

GATEWAY NORTHEAST OPPORTUNITIES

Senior Software Engineers/ Project Managers

- Network/Communications
- Graphics
- Image Processing
- Macintosh Software Dev
- Windows Development
- Database

Requires C, Pascal, 8086, 68000, UNIX, VMS, MS-DOS, 3 - 7 years experience. For these and other positions call or write:

Harvest Technical
9 Walnut Street
Worcester, MA 01608

Worcester
(508) 792-4545

Westboro - Framingham
(508) 386-6855

Never a Fee.

Systems Analyst - Analyze worldwide test registration system, procedures & problems to refine data & convert to program. form for EDP. Problems: Timely general circulation of applications by student advisors, mngt of registration fees, control of fraud in registration & distribution of test scores & mngt of Ks for test sites/personnel. Evaluate HP3000 & HP1000 systems & design improved systems for current & projected needs; specify in detail logical & math operations by using Computer Data Structure, Computer Architecture, DB management & OS for equipment, programs & personnel. Develop customized software using Assembler & SPL language & HP-IB. MS Computer Science plus 1 yr exp. in job or in Systems Eng. $37,000/yr, 37.5 hrs/wk, 9am - 5pm. Send resume: Personnel Dir., TRECOM Business Systems, 333 Thornall St., Edison, NJ 08837-2246.

GO FOR THE GOLD

Just as the Olympians strive to reach the top in athletics, you too can reach that elevated center stage in your career. If you have their same desire to excel, have developed your skills, and have the courage to reach beyond today; CMSI will provide all the opportunity and support you need to succeed. Our expanding company offers you a position with growth potential, generous compensation, one of the best benefits packages in the industry, and the stability of a well managed, financially solid firm.

Continued growth (fifteen consecutive quarters) and the opening of offices in Atlanta, GA and St. Louis, MO, have created many new opportunities for the motivated professional to join our staff. If you have two or more years experience with any of the following:

- IMS DB/DC
- DB2
- CICS DL1/VSAM
- IDMS ADS/O
- LIFE 70
- COMETS
- PACBASE (Online & Batch)
- MSA (PMRS, HR, Payroll)
- WALKER General Ledger
- DEC/VAX (COBOL)
- AS/400, S/36, 38
- IBM COPICS

Please call or send resume to Don Thompson, Director of Research, 7948 Baymeadows Way, Suite 160, Jacksonville, Florida 32256, 1-800-552-CMSI

CMSI Computer Management Sciences, Inc.

ATLANTA/ST. LOUIS

In order that we may better serve our Fortune 500 clients, we are proud to announce the opening of offices in Atlanta, GA and St. Louis, MO. Expansion into these two great cities creates many new opportunities to join the staff of a firm recognized for providing some of the highest quality service in the industry. We can maintain this reputation only by employing the best talent available.

If you are interested in a career offering a personal challenge, professional recognition and advancement, financial reward, and the security of an excellent benefits package, contact us today.

Our current needs include but are not limited to:

- CICS DL1/VSAM
- IMS DB/DC
- COBOL
- IDMS AD/O
- DB2
- 4GL
- PACBASE
- DEC/VAX
- ORACLE

Call or send resume to:

Vern Summers, Branch Manager, 12400 Olive Blvd., Ste. 555, St. Louis, MO 63141, 314-275-4465

J.P. Stitch, Branch Manager, 1640-22 Powers Ferry Road, Marietta, GA 30067, 404-980-2593

Don Thompson, Director of Research, 7948 Baymeadows Way, Ste. 160, Jacksonville, FL 32256, 800-552-CMSI or 904-737-8955

CMSI Computer Management Sciences, Inc.

West Virginia University

The Department of Statistics and Computer Science invites applications for the position of Lecturer in Computer Science beginning January 1,1989. A MS in Computer Science with experience in Ada programming and a good background in statistics are required. The salary will be approximately $20,016 for 9 months. Responsibilities will include conducting Ada research and development under the direction of a faculty member and teaching introductory course work in both statistics and computer science. Please send resume, names of three references, and transcripts to:

Dr. Donald F. Butcher
Statistics and Computer Science
West Virginia University
Morgantown, WV 26506

WVU is an Equal Opportunity/ Affirmative Action Employer. Women and minorities are encouraged to apply.

DP PROFESSIONALS

Immediate opportunities currently exist for Senior Technical Professionals with the following expertise.

SYSTEMS PROGRAMMERS

IBM MVS, VM and Communications Systems Programmers are needed. Must be familiar with O/S structure and logic, diagnostics and architecture. Salaries $39-$72K

DATABASE SPECIALISTS

IMS, DB2, M204, ORACLE, IDMS, FOCUS, ADABAS, Designers, Project Leaders and DBA's are needed for new development opportunities. Salaries: $23-$67K.

Positions are available in North East, Mid-Atlantic and Sunbelt locations.

For more information call Mike Loftus at (301) 770-5290 or send resume to:

DCSI
6290 Montrose Road
Rockville, MD 20852

COMPUTER CAREERS NETWORK

Now you can recruit the best qualified computer and communications professionals regionally, nationally and weekly.

How?
With IDG Communications new Computer Careers Network. Choose from the Network's eight computer-related newspapers and tailor youre recruitment message to the type of talented professionals you need to reach -- professionals that read Computerworld, InfoWorld, Network World, Digital News, Federal Computer Week, and Computer Currents. Then, target your audience by region. Or blanket the entire nation.

Call your local sales representative today for more information about Computer Careers Network's regional, national and weekly reach.

Sales Offices
John Corrigan, Recruitment Advertising Sales Director, 375 Cochituate Road, Box 9171, Framingham, MA 01701-9171; 617-879-0700.

BOSTON: 375 Cochituate Road, Box 9171, Framingham, MA 01701-9171, Al DeMille, Regional Manager, Nancy Percival, Account Executive; 800-343-6474. (In Massachusetts, 617-879-0700).

NEW YORK: Paramus Plaza I, 140 Route 17 North, Paramus, NJ 07652; Warren Kolber, Regional Manager, 201-967-1350; Jay Novack, Account Executive 800-343-6474.

WASHINGTON, D.C.: 3022 Javier Road, Suite 210, Fairfax, VA 22031; Katie Kress, Regional Manager, 703-573-4115; Pauline Smith, Account Executive 800-343-6474.

CHICAGO: 10400 West Higgins Road, Suite 300, Rosemont, IL 60018; Patricia Powers, Regional Manager, 312-827-4433; Ellen Casey, Account Exective 800-343-6474.

LOS ANGELES: 18004 Sky Park Circle, Suite 100, Irvine, CA 92714; Barbara Murphy, Regional Manager, 714-250-0164; Chris Glenn, Account Executive, 800-343-6474.

SAN FRANCISCO: 18004 Sky Park Circle, Suite 100, Irvine, CA 92714; Barbara Murphy, Regional Manager, 714-250-0164; Chris Glenn, Account Executive, 800-343-6474.

STATE-OF-THE-ART SHOPS 100'S DP OPPORTUNITIES

CICS – P/A's, MVS or DOS	$27-36K
CICS or OB2 – Mfg. Appl., Cobol	$28-40K
IMS DB/DC – P/A's	$27-36K
IDMS-ADS/O – P/A's	$28-36K
ADABAS/NAT'L – P/A's	$28-36K
Bank – IBM or Burr P/A's	$28-38K
Ins. – ALC, LIFE COM, LIFE 70	$30-42K
MSA – P/A's, G.L. or Payroll	$33-40K
PL1 – P/A's	$29-38K
McCormick & Dodge P/A's	$38-42K
ORACLE	$30-36K
Dec Vax – RDB	$27-35K
FOCUS – VM/CMS	$28-35K
IDEAL, Oatacom	$27-35K
Sys 38 – P/A's RPG III or Cobol	$27-35K
Sys 38 – S/A's, RPG III, JD Ed	$30-40K
MAPICS, RPG II, RPG III, P/A's	$27-36K
HP 3000, Cobol Cognos	$27-35K
HP 3000, Cobol ASK MAMMAN	$27-36K
UNIVAC 1100 P/A's Mapper	$28-35K
OB 2 – P/A's SQL	$28-40K
Sys. Prog. MVS/XA, NCP, VTAM	$38-48K
Data Base Anal's, IMS or IDMS	$40-45K

Major Co.'s seeking confident promotable, D.P. Professionals w/ 2+ yrs. work expr. Locations: So., S.E., Many Carolina's & Nationwide. Ask for our Free Resume Guide. Attn: T. Smith, D.P. Spec. (504) 295-1240

BADON'S DP Div.
5637 GALERIA, BATON ROUGE, LA 70816
"Interviews & Fee's Paid by Client Co.'s"

SENIOR SYSTEM ANALYST - Design, develop, unit test, integration test & modify communication systems networking, money transfer systems software development. Design communication processes using flash protocol to communicate between DEC & IBM computers. System level programming on VAX/VMS, design & program asynchronous interfaces to RMS File Management, TDMS, LOCKMANAGER & multi-threaded processes. Review & analyze program specifications, debug, prepare program documentation for implementation. Utilize C, COBOL, FORTRAN, & BASIC Languages & Operating Systems VAX/VMS, TDMS, APH, FMS & INTACT. 40 hrs, BSC in Computer Science & 4 yrs experience, $45,000/yr. Resume & refs. to Ms. Schriever, Comtext Systems, 116 John St., NY, NY 10038.

TECHNICAL SUPPORT
MVS/XA/CICS/CA-UNICENTER/INFOMAN

The WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY (METRO) is looking for EXCEPTIONAL professionals for the Office of Management Information Services. We require technical support persons for:

- **SYSTEMS SOFTWARE ENGINEER.** Significant experience with MVS internals, JES2, SMP/E, exits, SMF, CICS, tuning, and non-IBM products. Prefer MS/CS degree and some supervisory experience. Salary range $42K - $56K.
- **SYSTEMS PROGRAMMERS.** Three (3) years experience with MVS internals, CICS, SMP/E, ASSEMBLER, IOGEN, DASD Management. Prefer BS/CS degree. Salary range $37K - $50K.

NOTE: For the above openings, experience with ADR's Librarian, ROSCOE and CA Unicenter highly desirable.

- **NETWORK CONTROL TECHNICIAN.** One (1) year experience in IBM or compatible mainframes, preferably in Tech Support, familiar with ISPF, Top Secret, help desk and customer support. Salary range $17K - $23K. THIS IS A PART-TIME PERMANENT POSITION.

METRO offers an environment where creative MIS personnel can implement innovative systems and solutions during transition from IBM 3081 with VM/DOS to 3084-class machine under MVS/XA.

METRO provides an extensive benefits package which includes a transit pass and a deferred compensation plan. Interested candidates should forward their resume including salary history and requirements in confidence, to reach us by October 17, 1988.

ATTN: Ms. Sheppard
Office of Personnel and Training
WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY
600 Fifth Street, N.W.
Washington, D.C. 20001
AN EQUAL OPPORTUNITY EMPLOYER

A Terrific Opportunity

Computer Consulting Group, one of the Southeast's fastest growing contract programming and consulting firms, has immediate openings for talented Programmer/Analysts with 2 or more years experience. Excellent salary & benefits package.

We're especially seeking:
DEC/VAX/FORTRAN
IDMS/ADSO MANUF
CICS/DL-1
NATURAL/ADABAS
DEC/VAX/COBOL
HP 3000 prog/anal
WANG/COBOL
UNIX/"C"
DEC/VAX/RDB
IBM/SYS/38 RPG III-MAPICS
VAX/INTERGRAPH
CRAY/CTSS
Technical Writers
DBA - IMS DB/DC
HP 9000 FORTRAN

Computer Consulting Group
Contract Professional Services

Contact Us Today!
4109 Wake Forest Rd.
Suite 307
Raleigh, NC 27609
Outside South Carolina
1-800-222-1273

Analyst/Programmer - Design, test & implement batch and on-line financial and information management systems utilizing Natural language and Adabas file design under CICS or MVS. Prepare systems documentation. Convert existing Cobol systems to Natural. Test systems with sample data. Enhance or debug existing systems and programs. 40 hrs/wk, $36,000/yr. 2 yrs experience. Resumes to Computer Consulting Services, Inc., 345 Route 17, Upper Saddle River, NJ 07458, Attn: B. Botes.

PROGRAMMER ANALYST
System/38 RPG III

We are searching for an additional member for "Team Summit". Information professionals with 3 + years programming experience in RPG III and CL. Knowledge of insurance industry desirable. PC experience a plus.

If you qualify send your resume to:

Personnel Director
Summit Consulting, Inc.
P.O Drawer 988
Lakeland, FL 33802

FLORIDA + SOUTHEAST

It's warm in Florida all winter long. Relocate now! Openings for the following:

- System 36,38
- IMS, IDMS
- CICS DL/1
- UNIX, C
- FOCUS
- Any Burroughs

Call Kimberly at 407-859-9071 and send resume to:

Systems Software Specialists
955 W. Lancaster Rd.
Suite 250
Orlando, FL 32809

Advertise in the COMPUTER CAREERS Section and you'll get the responses your looking for

Project Engineer

Mass Memory Products

Ponosonic Technologies Incorporoted, o member of the Motsushito Electronics Group is currently seeking o Project Engineer to work with informotion ond moss memory products.

The responsibilities of this position will include being the technicol lioison to the foctories, developing products for the Americon morketploce os well os troveling to trode shows/conferences, preporing reports ond working with potential ond existing customers to onolyze requirements.

To quolify, you need o BSEE or reloted degree plus 2-3 yeors honds-on experience working with personol computer storoge systems including mognetic ond/or opticol storoge products or smoll computer interfoce.

While hordwore knowledge is essentiol, softwore knowledge would be o definite osset.

We offer on excellent storting solory ond benefits pockoge. For further informotion, pleose send resume which must include solory history/ond requirements to: **Dept. DBMM, Matsushita Electric Carporatian of America, Panazip 3C-5, 1 Panasanic Way, Secoucus, New Jersey 07094.** An equol opportunity employer.

Matsushita
Electric Corporation of America

B R S
INFORMATION TECHNOLOGIES

MARKETING PRODUCT MANAGER SOFTWARE

One of the world's largest suppliers of information and a distinguished innovative leader in online database services and software development seeks a Marketing Product Manager, Software, to lead the marketing activities for an established text retrieval software product line and an exciting new product related to software.

Activities will include market research, identification of appropriate market segments and opportunities, and development of market and promotional plans.

Successful candidate will possess BS in Computer Science, 3-5 years mini and/or mainframe software sales and marketing including proposal writing experience, market plan development, market research, and some international experience.

We offer a competitive compensation and benefits package. Send resume to:

BRS INFORMATION TECHNOLOGIES
Human Resources Dept. – E12/8
1200 Route 7
Latham, New York 12110

Equal Opportunity Employer M/F

DATA PROCESSING SPECIALISTS

TANDEM ● DEC/VAX ● IBM

The Ciscorp project development divisions have grown an impressive 71% as of August 31, 1988 by using state-of-the-art databases for major projects and professional service engagements.

Our continual growth has necessitated the hiring of over 100 new professionals during 1988. New projects will create an additional 52 opportunities for experienced database specialists by year-end.

We are one of a few companies in the United States offering **SQL** expertise within a **TANDEM** environment. We have developed unique databases as a **TANDEM** alliance member, for many blue chip companies. This partnership with **TANDEM** has created opportunities for individuals familiar with design, analysis and programming on **TANDEM** hardware.

Our **IBM** division has positions available for individuals experienced with: **IMS, DB2, TELON, RAMIS** and **ADABAS.** Within our **VAX** division, we are currently hiring for professionals experienced with **ULTRA/SUPRA, POWERHOUSE,** and **RDB.**

We offer competitive salaries, company benefits and relocation assistance.

For consideration, please submit resume or for more information call Mr. James Leindecker.

CIScorp

850 Boyce Road
Bridgeville, PA 15017
412-221-4410

DP PROS

CONTRACT PROGRAMMERS

Contracts Available
Southeast Locations
All Applications

- UNIX, C
- ORACLE
- CICS
- DB2/SQL
- IMS DB/DC
- S-38, RPG III
- FOCUS
- IDMS, ADS/O
- CULPRIT
- HP 3000
- POWERHOUSE
- ADABAS/NATURAL
- DEC
- VMS

Call or Send Resume
DP PROS, INC.
P.O. BOX 2229
BURLINGTON, NC 27216
(919) 222-8030

SINCE 1969

FLORIDA CONNECTION

P/A's IMS DB2 IDMS	To 40K
P/A UNIX C ORACLE	To 45K
DBA's DB2 IMS	To 45K
P/A's IMS/DL1 CICS	To 36K
P/A HP3000 ASK	To 33K

Call Russ Bray, CPC

DBA M204 or Modelling	To 40K
S/A Burr Banking	To 35K
P/A's S-38 36 RPG3 2	To 40K
P/A MVS BAL Fortran	To 36K
P/A's C Assembler PC's	To 38K

Call Leslia Miksch

AVAILABILITY, INC.
813/288-8800
Dept. C, P.O. Box 25434
Tampa, Florida 33822

K E A N E

OPPORTUNITY

How has Keane grown more than 50% in the last year to become a $60M applications software company? By making a difference to its Fortune 1000 clients, and providing to its employees opportunities for technical challenge and professional development.

We are currently seeking experienced programmers and programmer/analysts with a minimum of two years of COBOL plus one or more of the following: IDMS, IMS, CICS, DB2, TELON, DATACOM, VAX/MAXCIM, WANG VS, 4GL's, ADABAS, MARK IV, PL1, IBM PC, PACBASE.

Opportunities exist in: Bedford, NH; Boston & Lexington, MA; Columbia, MD; Meriden & Stamford, CT; Minneapolis & Rochester, MN; New Providence, NJ; Portland, ME; Providence, RI; Wayne, PA; Chicago, IL.

Add challenge, growth and success to your career. For more information on positions at any Keane location, call Renee Southard at 1-800-36-KEANE, or send a resume (in confidence) to her attention at: Keane. Inc., Ten City Square, Boston, MA. 02129.

KEANE

MAKING THE DIFFERENCE

An equal opportunity employer.

IRM CONSULTING

Client demand continues to allow us to increase our Management Consulting staff at junior levels. We have significantly increased our staff in the first quarter, and our needs continue throughout the Southeast Region. Successful candidates will be able to demonstrate a strong educational background and experience in a structured consulting environment.

Information Technologists	**-Rule-based/Expert Systems** **-DB2 Design and Analysis** **-ADR/Datacom/IDEAL** **-CASE technologies** **-TELON**
Manufacturing Systems	**-ASK/AMAPS Implementors** **-MRP II** **-Manufacturing Cost**
Financial Services	**-Banking Software** **-Operations Analysis**
Systems Analysts	**-Packaged Software** **-AS400** **-4th GL's**

Positions are available in several locations in the Southeast including Philadelphia, Washington, Charlotte, Atlanta, Tampa and Miami. Please submit your resume including salary history and geographic preference to:

Price Waterhouse
30 South 17th St
Philadelphia, PA 19103

ATTN: Jim O'Reilley
No phone calls or agencies please.

Price Waterhouse

BRANCH MANAGERS

MicroTemps Inc., a leading national software contracting firm, has several East Coast opportunities available for aggressive individuals with a proven sales management track record. Responsibilities include: staffing, training, expansion of market share and branch profit and loss.

If you feel you qualify please call:

Jeffrey J. Bowe

(617) 449-6685

TAC **MicroTemps**®
SYSTEMS and PROGRAMMING

15-19 CRAWFORD STREET, NEEDHAM HEIGHTS, MA 02194

• DURHAM
RESEARCH TRIANGLE
• RALEIGH
• CHAPEL HILL

RESEARCH TRIANGLE, NC and METRO INFORMATION SERVICES, INC.

Two Fast Growers

The Research Triangle's many attributes, such as fast growth, a quality lifestyle and educational opportunities, rank it as one of the best places in the country to live. Excellent cultural and recreational resources abound in the area.

METRO, a nationally recognized professional services company, serves Clients in the Research Triangle area. We offer challenging and rewarding careers with excellent benefit and compensation packages.

We are currently looking for Programmer/Analysts with one or more years experience in one of the following areas:

*** "C" * DB2 * CSP**

Call or send resume to:

METRO
Information Services, Inc.
Attn: Joy Hood, Dept. 141
2626 Glenwood Ave., Suite 360
Raleigh, NC 27608
(919) 783-8887

GREATER BOSTON AREA
SYSTEM-38 P/A'S

Diverse employers seek solid RPG-III devel. skills w/full cycle apps proj. exp. This market offers exceptional choices for tech pro's including AS400 convs. Call today for a sample of Co's, Loc's. & positions avail to you! Salaries to low $40's. Call Data Processing Division (in confidence), Robert Half of Boston, Inc, 101 Arch Street (32 Summer Street), Boston, MA 02110. Tel. 617-951-4000. Personnel Consultants. Client company assumes all fees.

Data Processing Professionals

Can we SABRETALK?

If you have knowledge of IBM Assembler or SABRETALK, we can. We can talk about PARS Service (Programmed Airline Reservation System), our dynamic, growth-oriented company that offers an exciting future. We can talk about how two of the country's most successful airlines merged their computerized reservation systems to form PARS Service, a new company. And we can talk about how a job with us will take you places, professionally and personally.

PARS Service provides state-of-the-art computerized reservation service to TWA and Northwest airlines. We also develop and improve products for the travel agency industry.

Take off in your career and enjoy worldwide travel privileges on both airlines. We have comprehensive benefits, including:

- **Competitive salaries**
- **Hiring bonus**
- **Professional/technical training**
- **Non-contributory health insurance**
- **Eyewear program**
- **Relocation expenses**

We're situated in the charming City of Fountains — Kansas City — one of the most livable spots in America, ranked 18th in per capita income and 12th in educational achievement.

Curious? Let us tell you more about who PARS Service is, and how we can offer you a world of opportunities. Send your resume to:

Employment Supervisor
PARS Service Partnership
P.O. Box 2007
Kansas City, MO 64195

Equal Opportunity Employer

PARS SERVICE
THE INFORMATION SYSTEM THAT SPANS THE WORLD

DATA BASE DESIGNER & CONSULTANT. Design Integrated Data Base Management Systems (IDMS). Custom design of application software to fit IDMS data base systems. Prepare appropriate reports after complete analysis of management information status. Meet with customers to prepare systems & software installation & initiate operation of installed system. 40 hrs/wk; 8:30 am - 5:00 pm; $37,715/yr. Must have Master's degree in Computer Science or Management. Undergraduate degree must be in either engineering or computer science. Course work for Master's degree must have included courses in Data Base Management & Marketing Research & Information Systems. Must have at least one year in the offered position or two years experience as a Data Base Designer or Systems Analyst. Prior experience must also have included experience on large IBM mainframe installations. Send resume to Illinois Department of Employment Security, 401 South State Street - 3 South, Chicago, IL 60605; Attn: Mr. Lenonard Boksa; Reference #8597-B. An employer paid ad.

PRODUCT MANAGER. Resp. for conducting market research, analyzing results, recommending specific products & features for development; ensuring that products are developed to meet customer requirements in domestic & international markets; recommending specific sales strategies & prices for domestic & international markets; & other related duties. Reqs. 7 yrs. exp. in job offered or 7 yrs. technical exp. in SNA communications. Exp. must include 7 yrs. of specific technical exp. with SNA & different architectural approaches imbedded in it (IMS, CICS, & RJE); 5 yrs. of specific marketing exp. with communication strategy (national & international); 2 yrs. of specific marketing exp. with X.25 products; & 2 yrs. of specific marketing exp. with SNA PADs. Salary: $48,000/yr. Job site: Richardson, TX. Apply at the Texas Employment Commission, Dallas, Texas, or send resume to the Texas Employment Commission, TEC Building, Austin, Texas 78778, J.O. 5418035. Ad paid by An Equal Employment Opportunity Employer.

SYSTEMS DESIGNER

A Systems Development Group, using Wang Equipment, is searching for a candidate with good technical and analytical skills to be used in Systems Design. The candidate must also have a good working knowledge of COBOL and experience in an analytical function. Property and Casualty insurance experience would be a plus. The candidate must be willing to relocate to Luverne, MN. An excellent benefit package is provided. Salary is commensurate with experience. Send resume and salary requirements in complete confidence to:

Vice President-
Human Resources
Berkley Holding Corporation
P.O. Box F
Luverne, MN 56156
We are an Equal Opportunity Employer.

SYSTEMS ENGINEER-Upgrade and sustain high speed hard disk controller utilizing bit-slice technology; develop high performance board level input-output products for present and future generation multiprocessor computer systems, using CAD tools, emulators for circuit design development and requiring working knowledge of computer communication/interface system design and worst-case board level microprocessor based design techniques. M.S. in E.E. or equivalent. Requires academic project or research background in bit-slice processing technology. $2750/mo.; 40 hrs./wk. Place of employment and interview: Beaverton, OR. Must have legal right to work. Clip ad and send with resume to: Job Order #2120448, 875 Union St., N.E., Salem, OR 97311 no later than Sept. 22, 1988. EOE.

When you compare costs and the people reached, Computerworld is the #1 medium for computer-related recruitment advertising.

Place your ads today!

Call toll-free
800-343-6474
In Mass
(508) 879-0700

The Finest Source of EDP Professionals in Northern California

For over 15 years the best companies have relied on CRG to find superior data processing professionals to meet their needs.

Give us a call or mail your resume today to find out what we can do for *you*. 303 Sacramento Street, San Francisco, CA 94111, (415) 398-3535-OR-3080 Olcott St., Suite 130A, Santa Clara, CA 95054, (408) 727-1658.

The Computer Resources Group, Inc.

An Affiliate of National Computer Associates

CONSULTING
IMMEDIATE OPPORTUNITIES

FOCUS, VM/CMS
DB2, CICS
IMS DB/DC
ADABAS/NATURAL
IDMS, COBOL/CICS
ORACLE
ORACLE to DM IV
PL/1 Progrs
C/DOS, OS2
C/UNIX Progrs
ADA Progrs
PRIMOS INFO/BASIC
GCOS 8, GMAP
TPF Sys & Appl's
IBM SW Testers
MICROSOFT WINDOWS
HP Star Based Graphics
Datapoint, Databus, Vista
Telephony Interface SW
Analyst, 3020.26, COOP
Tech Writers: GML, ISIL
Tech Writers: ADA, 2167

CALL 301-921-8866

COMSYS
Attn: CW
4 Research Place, #100
Rockville, MD 20850
E.O.E.

Programmer-Analyst; 40 hrs/wk; 9am - 5pm; $29,564/yr; Overtime as needed, compensated at $15/hr. Job requires master's degree in computer science. Job also requires: 1) 1 grad course in which relational & hierarchical data bases were studied; & 2) 1 grad course in data structures. Job duties: Under supervision of team leader design, develop, test & implement computer systems for manufacturing application for various client projects. Using relational, hierarchical, or network databases, develop system to client specification. Write COBOL applications in an IMS DB/DC environment using DB2 database on an IBM mainframe. Qualified applicants should send resume & verification of reqs. to 7310 Woodward Ave., Rm. 415, Detroit, MI 48202. Ref #56888. Employer Paid Ad.

UNIX R&D

ProTec is a consulting firm supporting the UNIX industry that can offer challenging software development projects in telecommunications, switching systems and databases. Prefer MS/PhD in Comp Sci/EE with strengths in UNIX (System V or 4.xBSD), C or Shell and appropriate applications. We are UNIX specialists offering a very competitive salary, benefits and relocation package, plus the opportunity to work with the best in the field.

The ProTec Group Inc.
2941 Kenny Road, Suite 255
Columbus, OH 43221
(614) 457-8055
UNIX is a Trademark of Bell Labs

SOUTHWEST

Southwest Airlines
Data Base Analyst

Southwest Airlines has an immediate career opportunity for a creative Data Base Analyst. Join one of the nation's most dynamic and successful air carriers in an expanding Dallas-based information systems department. The ideal candidate will have 3 - 5 years IDMS in an IDMS/DC ADS/O environment, with 1 - 2 years as a Data Base Analyst. This enthusiastic person should also have experience in physical and logical design, applications, migration, and installation, and maintenance of Cullinet applications software. We offer an excellent airlines benefit package. Please send resume and salary history to:

Southwest Airlines
Personnel Office, Attn: JK
P.O. Box 37611
Love Field
Dallas, Texas 75235
EOE M/F/V/H

FLORIDA

IMS DB/DC

A "State of the Art" data center seeks 4+ yrs exp in MVS, IMS, COBOL. Good design & anal skill. Degr a +

$45,000

Russell-Warner Associates
2203 N. Lois Ave. • Suite 100
Tampa, FL 33607
(813) 870-8606

COMPUTER INSTRUCTORS

Part time professionals needed for international firm. Currently seeking instructors experienced in Sun and Digital equipment.

Send resumes to:

Susan
P.O. Box 690590
San Antonio, TX 78269-0590
Equal Opportunity Employer

Where do the best computer professionals look for jobs?

Right here. In fact, more computer pros read more computer recruitment ads in *Computerworld* than in any other newspaper.

Talk to the best. Run your ad in *Computerworld*. For more information or to place your ad regionally or nationally, call Lisa McGrath at 800-343-6474 (in MA, 617-879-0700).

Weekly. Regional. National. And it works.

An IDG Communications Publication

SAUDI ARABIA

SAUDI IRON AND STEEL COMPANY (HADEED)

BASIC SALARIES $35 - 45,000 TAX FREE

TWO YEAR RENEWABLE CONTRACTS

Hadeed offers an excellent benefit package including: free furnished accommodation, medical insurance, schooling allowance, car purchase scheme, annual return flights for holidays, six weeks annual vacation, contract completion gratuity, family status, etc. Hadeed is the largest steel producer in the Kingdom of Saudi Arabia and has over 2,000 employees.

The Company computing facility comprises multiple PRIME CPU's with a number of minis and micros; new development plans for 1989 have created opportunities for the following personnel:

SYSTEMS PROGRAMMERS

To investigate and advise on the efficient use of systems software, and to be responsible for its installation and maintenance. Key involvement will be in systems design, modification and implementation, also in the control of the Data Base Management System.

Five years experience in Systems Programming, at least three years on PRIME would be ideal. Exposure to Data Base packages such as DBMS, INFORMATION, ORACLE or INGRES would be a definite plus.

PROGRAMMER/ANALYSTS

To analyze, design, develop and maintain business application systems. Good communication and analytical skills, and an in depth knowledge of COBOL are essential. Experience with DBMS software and on-line systems is needed, preferably in a mini environment.

TRAINING SPECIALIST

To plan, supervise and coordinate the training requirements of Saudi Nationals. To define training requirements, and to instruct young Saudi computer professionals in Data Processing theory and practices.

Eight years DP experience with at least four years in a computer training environment which has involved an on-the-job training approach is required.

A good knowledge of analysis and programming methods and techniques is essential.

For all positions preference will be given to applicants with a good college degree.

Please FAX or send your details to Jenny Dalrymple-Hay quoting reference number 5213 to the following address:

DALROTH & PARTNERS LIMITED, 12 GLOUCESTER PLACE, LONDON, W1H 3AW, ENGLAND. FAX NO. UK 1 486 0670. TELE NO. UK 1 935 2983.

COMPUTER PROFESSIONALS

Growth Has Created A Need For The Following Professionals!

Simmonds Precision Aircraft Systems, a division of Hercules Inc. and a leader in the development and manufacture of highly regarded avionic performance products, is expanding its Data Processing Operations. Our IBM computing environment is based around a 4381 running VM, DOS/VSE, DL/1, CICS, VTAM and SNA.

SYSTEMS PROGRAMMER—IBM

The successful candidate for this position should have a Bachelor's degree in CS or equivalent work experience. A minimum of 2 years experience supporting CICS, VTAM and NCP is also required.

SR. PROGRAMMER ANALYST

A Bachelor's in CS and/or equivalent and a minimum of 5 years in manufacturing and/or financial applications with COBOL programming in an IBM 4300 environment are required. DOS/VSE, CICS and DL/1 are preferred.

PROGRAMMER ANALYST

A Bachelor's in CS and/or equivalent and a minimum of 3 years experience in manufacturing and/or financial applications with COBOL programming in an IBM 4300 environment are required. DOS/VSE, CICS and DL1 are preferred.

Located near the majestic Green Mountains of Northern Vermont, a career with us will offer the technical challenges you seek combined with a beautiful natural environment offering some of the most outstanding recreational and cultural activities found in the Northeast with easy access to Burlington International Airport, Boston and Montreal.

We offer competitive compensation and excellent benefits including 401K. Put your skills to the test! Send your resume, in confidence to: **Judith Werling, Human Resources Department, Simmonds Precision Aircraft Systems Division, Panton Road, Vergennes, Vermont 05491.** Affirmative action/Equal opportunity employer.

Simmonds Precision

A Subsidiary of Hercules Incorporated

Where Technology Takes Flight®

SENIOR SYSTEMS ENGINEER - Full time position available with company engaged in Business Management and Information Processing Consulting Services. Duties: Analyze data processing requirements and determine electronic data processing system providing system capabilities required for projects or workloads. Use knowledge of electronics, data processing principles, languages, software and equipment. Consult with management and systems personnel regarding limitations and capabilities of existing systems and determine intent and capabilities required for proposed system. Recommend layout for hardware and peripherals, and suitable software, based on accumulated data and projection for efficient operations. May supply power requirements and configuration. Utilizing machine and applications language, develop programs and routines. Assign, coordinate and review work of Data Processing Analysts carrying out tasks related to Systems Design and Analysis, Programming and Technical Systems Development and implementation. Responsible for project management duties, including contract negotiation/modification, and for meeting contractual terms and conditions with regard to time and budget. Requirements: Bachelor's Degree in Computer Engineering Technology and two years experience as System Programmer. Must have experience with the following programming languages: IBM System/370 Assembler; IBM 4700 Finance Controller Language/ Restructured Extended Executor (REXX); VSE and MVS Job Control Languages. Hours: 40+ per week, 8:30 a.m. to 5:30 p.m. Salary: $41,000. Apply To: Job Service, 500 West Trade St., Charlotte, N.C. 28202 or nearest Job Service Office. Refer to Job Order Number NC8609800, DOT Code 003.167-062.

ENERGY MANAGEMENT COMPUTER ANALYST

Will design, code, debug, and maintain energy management computer software. Involves design and programming of mini/micro computer operating systems, languages, real time data base control, process control algorithms, hardware interface software etc. Involves use of machine language, assemblers, Pascal and C compilers. Will coordinate system software design with hardware design engineers. May travel to various out-of-state locations to coordinate design projects with consulting engineers, software houses and similar departments in other organizations.

Requires Master's in Computer Science, plus two years experience in process control software, or Bachelor's in Computer Science plus four years experience in PCS or a combination of education and experience from which similar capabilities can be demonstrated. Salary open.

Apply with letter of application, resume and names of three references to:

Mr. Jim Hines
Energy Conservation Manager
University of Nebraska-Lincoln
Lincoln, Nebraska 68588-0605
(402) 472-3131
Affirmative Action/ Equal Opportunity Employer

TARGET OPPORTUNITIES

Let us put our top notch staffing specialists to work for you. Hundreds of current needs include

UNIX Internals	to $65K
IDMS, IMS or ADABAS	to $50K
MVS or VM Internals	to $85K
IMS DBA's	to $70K
UNIX/C	to $50K
COBOL/CICS	to $45K
VTAM/NCP	to $65K
TANDEM (TAL, COBOL)	to $48K
CICS Internals	to $85K

TARGET SEARCH, INC.
7658 Standish Place
Suite 105
Rockville, MD 20855

VOICE. 301-340-7009
DATA. 301-424-0525

Mid-Atlantic Area Nationwide Affiliates

CONSULTANTS/ CONTRACTORS

Now there is an on-line database of requirements from contract companies and consulting firms coast to coast. All you need to access the system is a touch tone telephone! Call

919-766-3006

available 24 hours Sunday thru Friday

Consultants Hotline

Programmers

IBM®

SOFTWARE DEVELOPMENT OPPORTUNITIES

Banking Environment

IBM in Charlotte, North Carolina, has a continuing mission to develop and manufacture superior systems and products for the finance industry. We're actively involved in the use of image technology to provide customer solutions in item processing.

Opportunities now exist for career-oriented professionals with various levels of experience. Currently, we are seeking candidates with ALL THE FOLLOWING CREDENTIALS:

- Minimum of two years installing, modifying, and/or maintaining item processing applications such as Check Processing Control Systems (CPCS) or DOSCHECK.
- Minimum of two years S/370 Assembler programming in MVS/370, MVS/XA, or DOS/VSE environments. Experience with COBOL, VM/CMS, and SCRIPT/GML helpful.
- Experience in application development, including requirements, design, code, unit test, integration test, system test, and project management.

As part of The Bigger Picture of information handling and processing in Charlotte, you'll discover all the advantages offered by the largest city between Atlanta and Washington, D.C. Our broad range of cultural and recreational attractions includes museums, performing arts theatres, a world-class motor speedway and an NBA team—the Charlotte Hornets. Close proximity to our pristine beaches and mountains, and a year-round moderate climate are also ideal for the outdoor person.

Qualified applicants may explore these opportunities further by sending their resume in confidence to: **IBM Corporation, 1001 W.T. Harris Blvd., Dept. 16P/ Bldg. 667-4, Charlotte, NC 28257-3000.**

IBM The Bigger Picture

An equal opportunity employer

AUSTRALIA NEEDS GOOD DP PEOPLE!

PL/1*COBOL*IMS DB/DC
"C"*"REAL TIME"*TANDEM
TAL*PATHWAY*VAX/VMS

Our Australian clients have retained us to find top A/Ps with a minimum of 3 years experience. Register your interest NOW!

GROWING DEMAND FOR INSURANCE DP SKILLS
Do you have 2 years plus BAL, COBOL and CICS on large Insurance packages - LIFECOMM LIFE 70 * CYPROS * CCA * ALIS
Our specialist insurance DP Consultant has openings with local, national and international clients.

SYS 38/RPGIII SKILLS? YOU WILL STAR IN L.A.
We have job opportunities too numerous to mention. Make a smart career move and find your place in the sun!

MAIL YOUR RESUME NOW OR FAX (213) 553-7464
AUSTRALIA -
Attn. Gwllym Hughes
INSURANCE -
Attn. George Thomas
SYSTEM 38 -
Attn. Patty Montagna

SKILLED COMPUPEOPLE
A SKILLED GROUP COMPANY

10100 Santa Monica Blvd #990
Century City, CALIFORNIA 90067
TELEPHONE (213) 553-7130
LOS ANGELES SYDNEY
MELBOURNE LONDON

MMIS

Unisys, Systems Support Group, is one of the top suppliers of information processing services to State and Federal agencies. Currently we have medical claims processing opportunities in Colorado, Wyoming, Iowa, Kansas, Arkansas, Oklahoma, Louisiana, New Jersey and Massachusetts. The following opportunities are available:

- Application Programmers (COBOL/CICS)
- Provider Relations Specialists
- Claims Screening/Data Entry

Positions in management, supervision, and operations.

If you have the above expertise on MMIS then call Mr. Cordiano **to schedule local interviews, TOLL FREE (800) 233-7365** or send your resume to: **Unisys Corporation, Systems Support Group, Attn: Jeff Cordiano, Dept. 918, P.O. Box 10603, McLean, VA 22102.** An affirmative action employer.

UNISYS

M.I.S. MANAGEMENT

As a result of upgrading our technology and converting to an IBM 3090 MVS/XA system, we have entered into a significant expansion program. This includes embarking on a major systems development program with DB2 relational data base.

DIRECTOR – DATA ADMINISTRATION & SECURITY

Individual will be responsible for implementing IBM's CSP/DB2 relational software which will pave the way for a complete new portfolio of applications systems to be developed. Will play a major role in a team effort associated with new systems development, including the establishment of data architecture and data security guidelines. Must be skilled in relational data base architectures, with 2 years DB2 experience. This is a key management position within the Information Services team.

DATA BASE ANALYSIS/SECURITY

Individual will be responsible for data base structures and design, data security, design-for-performance criteria, and will assist the applications development staff in the implementation of a broad range of new business systems. Your background must include experience as a Data Base Analyst/Administrator in a relational data environment, preferable DB2. Those in an EDP Audit position who have relevant data base experience are encouraged to apply.

This is a unique career opportunity to join the world's largest winery in a responsible growth position. Enjoy affordable housing in the beautiful San Joaquin Valley located 90 miles from San Francisco and less than an hour from the foothills of the Sierra Nevada mountains. Send resume and salary history in complete confidence to:

Professional Staffing, Department CW
E. & J. Gallo Winery
P.O. Box 1130
Modesto, CA 95353.

E. & J. GALLO WINERY

Equal opportunity employer M/F/H

"ZZZZZ"

REST ASSURED.....thet e career move made through the nationally recognized executive search firm, H.T. McCormick Associates, Inc., will be handled with intelligence, professionalism end the highest degree of confidentiality. Company paid fees. Company paid relocation if appropriate.

Current openings in:

- Software development
- Date communications
- Systems Anelysis
- Programming
- Pre/post seles support

Positions require exposure to one or more of the following: Communications protocols, UNIX/C, SNA, BISYNC, ASYNC, LU 6.2, X.25, X.400, 4 GL languages, CICS, COBOL, IDMS, IMS DB/DC, VAX/VMS, Fortran, Oracle, Telon, Interleaf.

Please contact:

Todd A. Collier
Director,
Computer Science Recruitment
H.T. McCormick Associates, Inc.
P.O. Box 1206
Princeton, NJ 08540
Phone: (201) 297-6600
FAX: (201) 297-7391

Systems Testing Software Engineer. 40 hrs. weekly, 8AM-5PM, $16.00 hourly. Applicant will plen methodology for systems testing and test en internetionel ISDN switching system in both the laboretory environment and at customer site, designing and generating office dependent data as well as troubleshooting at both locations. Responsible for quality control of ISDN BRCS features in the 5ESS switch. Work is performed on the UNIX and super-computer 3B20 systems with C language. Masters of Science degree in Electrical Engineering end Computer Science and 3 months experience es a Systems Testing Software Engineer or 3 months experience es e Software Engineer required. Prior experience must include: application of static and dynamic anelysis in testing distributed switching systems; call processing (5ESS switch) et both feature and switch level. Graduate coursework must include Applied Graph Theory. Resume required. Contact: ILLINOIS DEPARTMENT OF EMPLOYMENT SECURITY. 401 South State Street - 3 South, Chicago, Illinois, 60605. Att: Marie Ninneman. Ref#8629-N. AN EMPLOYER PAID AD.

Recruit top talent regionally or nationally with Computerworld.

You can recruit qualified computer personnel across the United States when you place your advertising in *Computerworld*.

That's because *Computerworld* gives you your choice of regional or national editions to deliver your recruitment advertising message. And because you'll reach more than 612,000 computer professionals every week — including the nation's top talent.

Call Lisa McGrath at 800-343-6476 (in Massachusetts, 617-879-0700) for all the details.

Weekly. Regional. National. And it works.

An IDG Communications Publication

Swissair is looking for: TPF System Programmers.

Swissair, the airline of Switzerland, has immediate openings for experienced TPF system programmers at their headquarters in Zurich.

As one of the leading TPF software shops in the airline industry, we can offer you very attractive jobs and working conditions.

We are now migrating our Traffic System to a front end / back end concept under TPF 2.4.

The ideal candidates should have at least two years experience in TPF systems programming and a Bachelor's degree in computer science.

We offer competitive salaries and worldwide travel opportunities.

For immediate evaluation of your credentials, please send your confidential résumé with salary history and current requirements to: Swissair, Personnel Selection Ground Personnel / PBI, 8058 Zurich Airport, Switzerland, quoting vacancy notice no. 001.86.

swissair

IBM & DEC POSITIONS

Salaries from $28 to $50,000 dependent on experience

Rapidly growing southeastern consulting firm has immediate openings for Programmer Analysts with 2+ years experience in ADABAS/NATURAL, in a IBM or DEC environment.

We are also seeking individuals with proven DEC, VAX, FORTRAN skills to work with process control and factory automation systems.

Both permanent positions and contract assignments available. Contact:

Cindy Labell

DataMasters™
P.O. Box 14548
Dept. CW-CP
Greensboro, N.C.
27415-4548
or call collect
(919) 373-1461
FAX (919) 373-1501

SYSTEMS PROGRAMMERS/ INSTRUCTORS

If you possess the ability to communicate your skills to others and a desire to travel, continue your education and be your own boss, then read on. Previous teaching experience a plus. Verhoef Information Packages, a leader in DP Education, is seeking instructors in the following areas:

- **VTAM Internals/Prog**
- **SNA/NCP/APPC/X.25**
- **MVS**

Excellent benefits; 75% travel; 16 weeks paid vecation. Send resumes to:

Dr. Lenore Rubin
Verhoef Information Packages
799 Bloomfield Ave.
Verona, NJ 07044
1-800-631-0410

PROGRAMMER ANALYST

Florida's Palm Beaches

JFK Medical Center, the health care leader in the Florida Palm Beaches, seeks a Programmer Analyst for an opportunity in an MVS/SP environment with CICS and IMS database.

Excellent time for your move to the Florida Gold Coast–sunshine and blue skies all year round. Very competitive salary and benefits. To epply in confidence, send your resume to:

JFK
MEDICAL CENTER
Human Resource Dept.
P.O. Box 1489
Lake Worth, FL 33460

Equal Opportunity Employer

Systems Programmers & Programmer/ Analysts "Nationwide"

MVS/XA Sys Prog (Gens/Planning)	$48K
IDMS or IMS Prog/Analyst (Mfg Apps)	$39K
CICS Sys Prog (Maint./Debug)	$46K
MSA Prog/Analyst (Fin Apps/COBOL	$39K
NCP/VTAM Sys Prog (Gens/Tuning)	$46K
CICS or DBII P/A (Mfg Apps/COBOL)	$40K
ASSEMBLER Prog Analyst (Fin Apps)	$38K
LIFE/COM or LIFE/70 P/A (Ins Apps)	$42K
BANKING Prog Analyst (COBOL/MSA)	$38K
INSURANCE Prog Analyst (COBOL/PMS)	$42K

Please send resume to Robert Montgomery or call 919-787-4205

The Data Group
P.O. Box 52055
Raleigh, NC 27612

PERMANENT AND/OR CONSULTING POSITIONS

IBM

- Programmers-COBOL, CICS, 3-5 years experience
- Strong MVS Programmers

DEC

- Programmers--VAX, VMS, BASIC, banking experience a plus

UNISYS

- ALGOL Programmers

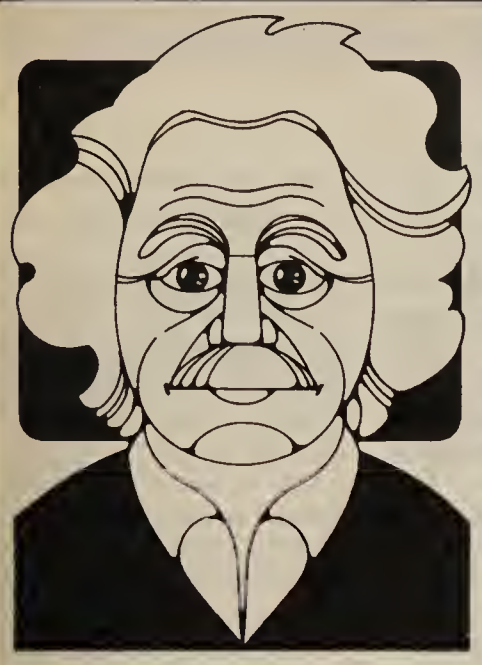
Please call 212-684-3950 Or Submit Resume To:

HANK WALSH ASSOCIATES
475 Fifth Ave, NY, NY 10017

COMPUTER SYSTEMS ANALYST - Analyze business procedures & problems. Responsible for the design & operation of networking; maintenance of existing data processing system. Confer with personnel to ascertain specific needs. Study existing systems and develop new systems according to needs. Outline data flow, coding. Responsible for changes, implementation, installation of computer hardware & software; troubleshooting; testing & debugging. $2,900/mo. BS in Computer Science plus 2 yr. exp. on job req'd. MS in Computer Science is acceptable in lieu of exp. Must be familiar with IBM PC 386 & MS/DOS. Knowledge in Dbase 3 is essential. Must have knowledge in Novell Networking for multi-user programming. Job & interview in Tustin. Send ad & resume to 1372 Valencia Ave., Tustin, CA 92680.

AS/400 Programmer Analysts

If you are an RPG II or III, System/36 or System/38 programmer or analyst, interested in joining one of IBM's fastest growing Industry Remarketers and developing software for the credit & collections industries, we would like to talk to you. Paid relocation to Northern Virginia. Please call D. Duran, collect, at (703) 448-9400 for additional information.



Computer Professionals: Some people were smart enough to create quite an impression.

Certainly there are no scientific or mathematical geniuses among our NCA consultants. But they are very smart in their own profession... particularly in respect to computer career advancement, both locally and nationally. They have developed a few ingenious theories of their own about how to advance your computer career most successfully. These theories have been time-tried...thousands of times... so we've made believers out of a lot of computer professionals.

Come in. Call. Or mail your resume to the NCA firm nearest to you. There is no charge to you ever for the use of our many excellent services. Now is the time to add a new dimension to your career.

ATLANTA: DataPro Personnel Consultants
400 Perimeter Center Terrace, Suite 650
Atlanta, GA 30346 (404) 392-4242
BALTIMORE: CIPS Inc
1107 Kennilworth Drive, Suite 206
Towson, MD 21204 (301) 296-8420
BOSTON: Robert Kleven & Co., Inc
P.O. Box 636
Lexington, MA 02173 (617) 861-1020
CHICAGO: Thomas Hirtz & Associates
150 North Wacker Drive, Suite 1700
Chicago, IL 60606 (312) 977-1555
CINCINNATI: Task Group
7875 Reading Road
Cincinnati, OH 45237 (513) 821-8275
CLEVELAND: Innovative Resources, Inc
Statler Office Tower, Suite 426
East 12th & Euclid
Cleveland, OH 44115 (216) 621-4220
COLUMBUS: Michael Thomas, Inc
450 W. Wilson Bridge Road, Suite 340
Worthington, OH 43085 (614) 846-0926
DALLAS: DataPro Personnel Consultants, Inc
13355 Noel Road, Suite 2001
Dallas, TX 75240 (214) 661-8600
DENVER: Abacus Consultants, Inc
1777 South Harrison Street, Suite 404
Denver, CO 80210 (303) 759-5064
DETROIT: Electronic Systems Personnel
3000 Town Center, Suite 2580
Southfield, MI 48075 (313) 353-5580
GREENSBORO: DataMasters
P.O. Box 14548
Greensboro, NC 27415-4548
(919) 373-1461
HARTFORD: Compass Incorporated
900 Asylum Avenue
Hartford, CT 06105 (203) 549-4240
HOUSTON: Career Consultants, Inc
1980 Post Oak Boulevard, Suite 1050
Houston, TX 77056 (713) 626-4100
INDIANAPOLIS: The Consulting Forum, Inc
11711 N. Meridian Street, Suite 200
Carmel, IN 46032 (317) 843-5585
KANSAS CITY: OP Career Associates
6405 Metcalf, Suite 502
Shawnee Mission, KS 66202 (913) 236-8288
LOS ANGELES: Superior Resources, Inc
22653 Pacific Coast Highway, Suite 1-106
Malibu, CA 90265 (818) 884-3000
MIAMI: Data Sciences Personnel, Inc
P.O. Box 8577
Hollywood, FL 33024 (305) 434-6112
MILWAUKEE: EOP Consultants, Inc
Chancellory Park II, Suite 350
350 N. Sunnyslope Road
Brookfield, WI 53005 (414) 797-8855
MINPLS./ST. PAUL: Electronic Systems Personnel
880 International Centre
900 2nd Avenue South
Minneapolis, MN 55402 (612) 338-6714
NEW JERSEY: Systems Search
2040 Millburn Avenue
Maplewood, NJ 07040 (201) 761-4400
NEW YORK: Botal Associates, Inc
7 Dey Street, Suite 410
New York, NY 10007 (212) 227-7370
PHILADELPHIA: Systems Personnel, Inc
115 West State Street
Media, PA 19063 (215) 565-8880
PHOENIX: Professional Career Consultants
4725 North Scottsdale Road, Suite 209
Scottsdale, AZ 85251 (602) 274-6666
ROCHESTER: Traynor Confidential Ltd
10 Gibbs Street, Suite 400
Rochester, NY 14604 (716) 325-6610
SAN DIEGO: Technical Directions Inc
5005 Texas Street, Suite 304
San Diego, CA 92108 (619) 297-5611
SAN FRANCISCO: The Computer Resources Group Inc.,
303 Sacramento Street
San Francisco, CA 94111 (415) 398-3535
SEATTLE: Houser, Martin, Morris & Associates
110 110th Avenue N.E., C-90015
Bellevue, WA 98009 (206) 453-2700
STAMFORD: Hipp Waters Professional Recruiting
707 Summer Street
Stamford, CT 06901 (203) 357-8400
SYRACUSE: CFA Associates Personnel Inc
5790 Widewaters Parkway
Dewitt, NY 13214 (315) 446-8492
WASHINGTON DC: Bill Young & Associates
8322 Professional Hill Drive
Fairfax, VA 22031 (703) 573-0200
AUSTRALIA: Kent Douglas & Associates
249 Pitt Street
Sydney NSE 200 Australia

National Computer Associates

MAINE - NH

We have specialized in data processing professional placement in Maine & NH for a quarter of a century. If you qualify for positions in the $25,000-$50,000 range, please contact us in total confidence. Our clients pay our fees and provide relocation assistance.

ROMAC®

Att: Dept. 2
P.O. Box 7040DTS
Portland, ME 04112
(207)773-4749

ANALYST/PROGRAMMER
Vienna, Austria

The United Nations Industrial Development Organization (UNIDO), with headquarters in Vienna, Austria, seeks Analyst/Programmer for commercial applications development in an IBM MVS environment.

The ideal candidate should have a university degree in Computer Science, Engineering, or related field and a minimum of five years experience in Information Systems. Preferrably, this experience should include IBM MVS, JCL, PL/1 or COBOL, CICS and a database management system such as DB2 or ADABAS. The working language is English.

Interested candidates should write to:

Recruitment Section, Room E0544, UNIDO, Vienna International Centre, P.O. Box 300, A-1400 Vienna, Austria

SENIOR SYSTEMS ANALYST
$38,000

Major Midwest service organization is expanding its Analysis group and seeks several Systems Analysts to help develop and support major new financial applications. Positions require 5+ years of large IBM-MVS development experience. COBOL programming background is a definite plus for these exciting new opportunities with great benefits.

ROBERT HALF
DATA PROCESSING
7733 Forsyth Blvd.
St. Louis, MO 63105
(314) 727-1535
FAX: (314) 727-1321

SAUDI ARABIA

Expansion-created opportunities exist with SYSOREX INFORMATION SYSTEMS in Riyadh where we are assisting the U.S. Customs Service and the Saudi Arabian Department of Customs in developing and installing a highly advanced DP application system using IBM PS2 workstations and LANs at multiple sites, connected to a central IBM mainframe running MVS with ADABAS and NATURAL.

Database Administrators

You will be involved in all aspects of a DBA role including database strategy, database security, integrity, performance, standards, plus guidance and support of development teams. To meet this challenge, you should demonstrate a strong applications background specializing in database development, ideally in a DBA role.

Successful candidates will be responsible for the full administration and support of all implemented database products (currently ADABAS/NATURAL, ORACLE and BTRIEVE).

If you have any experience in the design of database structures, data normalization, data security and control, data modeling and performance evaluation, you could be the person we seek for this position.

Software Engineer

Your excellent MS DOS experience is what we need for our fast growing 650 IBM Micro-based LAN. You will be working with MS Net, "C," Assembler tools and VMS in a mixed hardware environment of IBM/COMPAQ/VAX.

Interpersonal skills, technical ability and experience are the essential requisites for the successful applicant.

Our international team responsible for the project is ambitious, enthusiastic and goal oriented. In addition to the present Federal Income Tax exclusion, the package we offer includes fully serviced family and single accommodation with recreation facilities, car, health and welfare insurance, paid relocation expenses and much, much more.

Please send resume with present salary, indicating position for which you are applying to: Personnel Dept. CW-10/3, Sysorex Information Systems, Inc., 3 Skyline Place, Suite 700, 5201 Leesburg Pike, Falls Church, VA 22041. U. S. CITIZENSHIP REQUIRED. Principals only, please.

SYSOREX
Sysorex International Inc.

PROGRAMMER/ ANALYSTS

Bath Iron Works Corporation, one of the nation's leading shipbuilders, has several immediate openings for Programmer/ Analysts to support important ongoing and developmental programs. We offer a challenging and rewarding variety of opportunities in an excellent professional and geographic environment.

BIW is seeking candidates with 3-5 years experience in the following areas:

- CICS
- IMS
- DATACOM DB
- IDEAL
- EASYTRIEVE
- COBOL
- IBM Mainframe

BIW offers a competitive salary and benefits package, including relocation assistance. If you feel you meet the above requirements please forward your resume to:

Tom Parnell
Employment Department
Bath Iron Works Corporation
700 Washington Street
Bath, ME 04530

BIW

U.S. Citizenship Required

BATH IRON WORKS CORPORATION
SHIPBUILDERS AND ENGINEERS
700 Washington St., Bath, Maine 04530
An Equal Opportunity Employer M/F

KENDA SYSTEMS, INC.
BOSTON • NEW YORK • WASHINGTON

SOFTWARE CONSULTANTS

KENDA SYSTEMS provides consultants to the East Coast High Tech Community. Talented professionals who take pride in their work are welcome to register with KENDA SYSTEMS.

- *Communications: CCITT, X.25, X.400, SNA
- *Networking: LAN, ETHERNET, DECNET, NOURLL
- *Statistical: SAS, CICS, DB2
- *DOD: Secure Applications, Ada, Secret
- *Windows: SUN, UNIX, X-WINDOWS
- *Stratus: PL/1, C, Batch, Online
- *Layered Applications: VAX TOOLS, RMS, CMS
- *User Interface: MMI, VAX, PC, UNIX
- *Control System: Office Automation
- *Programmers: IMS/DB/DC
- *Database: SQL, INGRES, IDMS, ORACLE
- *Graphics: C, UNIX, VAX/VMS

Forward resume to Peter Krew.

2 Manor Pkway., Salem, NH 03079 603/898-7884

1000 DP Opportunities

System 38 Prog/Anal's (RPG III)	27-33K
MAPICS Prog/Anal's (S/36 or S/38)	30-45K
ORACLE SQL Prog/Anal's	29-39K
DB2 SQL Prog/Anal's	30-40K
UNIVAC 1100 Prog/Anal's	28-33K
FOCUS Prog/Anal's	28-35K
HP 3000/COBOL Prog/Anal's	27-34K
Series/1-EDL Prog/Anal's	30-36K
TANDEM Prog/Anal's	27-36K
ADABAS/NATURAL Prog/Anal's	28-36K
MSA Prog/Anal's or Sys Anal's	30-40K
McCormack & Dodge Prog/Anal's	30-40K
CICS Prog/Anal's (MVS or DOS)	27-35K
IDMS ADS/O Prog/Anal's	27-35K
IMS DB/DC Prog/Anal's	28-36K
Bank Prog/Anal's or Sys Anal's	27-45K
Insurance (PMS) Prog/Anal's	30-45K
Manufacturing Prog/Anal's (CICS)	28-35K
Data Base Anal's (DB2 or IMS)	40-55K
Sys Prog's (IMS or CICS)	33-40K

What do you want? A better opportunity, a more challenging position, a change in geographical location? Largest employment agency in Charlotte, in business since 1975. 150 affiliates. Fee paid.

Corporate Personnel Consultants
3705-320 Latrobe Dr., Charlotte, NC 28211
(704-366-1800)
Attn: Rick Young, C.P.C.

Florida

DON'T DREAM THE LIFE, LIVE THE DREAM!!!

Florida, with gentle winds bending the palms and an average temperature of 72°, is one of the finest places to live and work.

AMD Consulting Services is experiencing phenomenal growth. Our customers, Florida's premier information processing centers, have immediate needs for professionals with experience in any of the following disciplines:

- **IBM — CICS, COBOL, PL/1, Assembler, IMS (DB or DC), DB2, IDMS Model 204**
- **Tandem — COBOL, Pathway, TAL**
- **PICK**
- **Micro — "C," UNIX**

It's your move, make it the RIGHT ONE.

AMD CONSULTING SERVICES

One Harbour Place
Suite 880
Tampa, FL
(813) 229-5575

Lakeside Plaza
6301 NW 5th Way, Ste. 4700
Ft. Lauderdale, FL
(305) 928-0811

PRIME / TANDEM / IBM / WANG

Omni Resources is an EDP consulting firm with immediate consulting assignments nationwide.

We seek individuals with experience at all levels in the following.

PRIME INFORMATION		SCOBOL	PACE
IDEAL	DATACOM	CICS	DL1

For immediate consideration, please send your resume to:

Don Myles
OMNI RESOURCES, INC.
155 E. Silver Spring Dr. - 207
Milwaukee, WI 53217
(414) 332-5252
(800) 545-4141 EXT. 523

DP

S/38 - AS400 Local & regional positions for S/38 profess. Top pay for those skilled in RPGIII and CL. All levels of experience needed. Inquiries are confidential. Clients pay relocation and fees.

ROMAC®
Professional Recruiters
6000 Poplar Avenue, Suite 340
Memphis, TN 38119
901-685-8500 FAX:901-684-1800
Darlene R. Murphy, Partner

NATIONWIDE COMPUTER CAREER DATABASE

LOCATE THE IDEAL JOB FOR YOU!

FREE

NO IDENTIFICATION REQUIRED
NOT A RECRUITER
(313) 541-4369 24 HRS.
300/1200/2400 8/N/1

B-LINE INFORMATION SERVICES, INC.
23634 WOODWARD AVE.
PLEASANT RIDGE, MI 48069
VOICE: (313) 541-5566

MARKETPLACE

Mail-order vendors maturing

Many dealers of PC products now cater to corporate customers' needs

BY JOEY ROBICHAUX
SPECIAL TO CW

There are some things you just know. There is no need to think about them to make up your mind — you just know. This knowledge saves you time.

But it can also cost you something — accuracy. Sometimes, what you just know may no longer be true.

A recent poll showed almost half of all microcomputer professionals would never consider buying microcomputer products through the mail. They just know that buying locally makes sense. Knowledgeable sales professionals offer quick service and valuable advice. The service folks can patch the worst incurables and the training centers can flatten learning curves.

This view is common. But is it accurate? Not necessarily. It is a sure bet that a local zip code does not guarantee the best buy. Sometimes, the best technical support, the most responsible and professional salesperson, the widest product selection, the quickest delivery, the best price and the safest and most reliable purchase come when a customer buys mail order.

Here today . . .

Mail-order outfits suffer from a fly-by-night stigma. Everyone is worried that the outfit will disappear tomorrow — with their money. There are mail-order horror stories, and many of them are true.

However, a local dealer is susceptible to many of the same business challenges as a mail-order dealer and can also go out of business. Almost half of the computer stores doing business in my town a few years ago are no longer open. Like mail-order houses, local dealers can also refuse to refund money on faulty merchandise, employ salesmen who were selling shoes last week and stereos the week before or keep a machine for months to get it serviced.

Some purchasers buy locally to take advantage of local dealers' product recommendations, training or technical support. I have found this reason to be sensible. Most local dealers offer a wealth of knowledge — if a customer needs help with Lotus Development Corp.'s 1-2-3, Ashton-Tate Corp.'s Dbase or Wordperfect Corp.'s Wordperfect. They offer technical support as long as it is limited to the SoftSel Top 10.

> A RECENT poll showed almost half of all microcomputer professionals would never consider buying microcomputer products through the mail.

But corporate buyers do not need this expertise; they have already found solutions for their generic spreadsheet, word processing and database needs. Most of them have also built training programs and have a solid base of knowledgeable users to smooth the way for new ones. The training local dealers offer is valuable — if it is needed. If not, why pay for it?

It is not that corporate buyers never need advice. But their technical problems do not involve Lotus macros. They have problems routing print to a laser printer controlled by a device driver attached as a local printer to an IBM 3276 card connected to an IBM DOS/VSE system on a leased line.

The technical support for these problems comes from the manufacturer working with in-house technical people — not from the local computer store.

Product selection and availability is another consideration when purchasing microcomputer products. Local dealers have limited resources and limited shelf space. Companies can find Dbase, but they are probably out of luck if they need code generators, report writers or graphics packages.

Many mail-order outfits offer this variety; some even specialize in narrow niches such as programming products, operating systems, networks and process control.

These outfits are not staffed with your typical telemarketer. A customer might talk to a systems programmer, chemical engineer or telecommunications expert — someone who knows the market.

Catering service

Mature mail-order sellers have discovered the corporate market and cater to business buyers. They accept purchase orders, offer attractive terms, assign account representatives and take facsimile orders. With express shipping, a customer may actually receive mail-order purchases more quickly than he would a local order.

Local computer stores offer a valuable service — if it is needed. Many small companies do not have the in-house staff for product evaluation, training, technical support and information planning. Local retail stores provide a needed service to these users.

But larger organizations maintain a staff to address such requirements in-house. Their needs also tend to be more complex. For them, it pays to evaluate all solutions to information problems — including solutions offered by a maturing mail-order segment.

Robichaux is a systems analyst with Georgia Gulf Corp. in Baton Rouge, La.

PC Products

SAVE MONEY ON COBOL

We sell the full line of Micro Focus PC/Mainframe COBOL development tools including:

PC COBOL/2
COBOL/2 TOOLSET
COBOL/2 WORKBENCH
PC-CICS PC-IMS
SOURCEWRITER
And More

And we sell all of these for less than any other source.

Information Exchange Corporation
786 Rockrimmon Road
Stamford, CT 06903-1223
(203) 329-1132
FAX (203) 322-0419

A new way to advertise your PC products.... Look For "PC Products" each week in *The Marketplace*

Reach over 612,000 more customers every week in Computerworld's Marketplace pages.

Computerworld's product classified Marketplace lets you market your products and services to *Computerworld's* total (ABC-audited) audience of over 612,000 computer professionals every week.

Related editorial for drawing readers
Customers are also attracted to Marketplace by articles on computer training and market trends. Plus there's a Closing Prices Report on new and used equipment and Fair Market Value, a statistical summary from International Data Corporation.

Free typesetting and ad creation
Choose "display" or "set-solid" formats for your Marketplace ad - then let *Computerworld* create and typeset it for you free of charge.

Telecopier service
Send your ad materials to *Computerworld* in seconds with our telecopier service. The toll-free number is (800) 343-6474 ext. 739 or 740. In Mass., (508) 620-7739 or 620-7740.

Call your Marketplace sales representative today to reserve your space.

Southeast: Sales Director
(201) 967-1358
Northeast: Paul Bonarrigo, Account Manager
(508) 620-7784
Midwest: Marie Burke, Account Manager
(508) 620-7758
West: Karen Massimino, Account Manager
(508) 620-7759

COMPUTERWORLD MARKETPLACE PAGES

The BoCoEx index on used computers

Closing prices report for the week ending Sept. 23, 1988

	Closing price	Recent high	Recent low
IBM PC Model 076	$725	$1,000	$550
XT Model 086	$1,100	$1,250	$900
XT Model 089	$1,250	$1,500	$1,050
AT Model 099	$2,200	$2,450	$1,700
AT Model 239	$2,600	$2,900	$2,300
AT Model 339	$3,150	$3,650	$2,900
PS/2 Model 30	$1,525	$1,700	$1,300
PS/2 Model 50	$2,350	$2,600	$1,900
Compaq Portable I	$825	$975	$650
Portable II	$1,850	$2,000	$1,650
Portable III	$3,000	$3,550	$2,825
Portable 286	$2,050	$2,350	$1,675
Plus	$1,100	$1,100	$900
Deskpro 20-MHz	$1,025	$1,450	$975
Deskpro 286	$2,575	$3,150	$2,000
Deskpro 386	$4,625	$5,100	$4,200
Apple Macintosh 512	$750	$900	$595
512E	$775	$925	$600
Plus	$1,175	$1,325	$950
Plus 20-MHz	$1,425	$1,450	$1,300
SE	$1,950	$1,950	$1,700
SE 20-MHz	$2,400	$2,525	$2,250
II	$5,250	$5,250	$4,500
NEC Multispeed EL	$900	$950	$650
Toshiba T5100	$4,100	$4,500	$3,600

INFORMATION PROVIDED BY THE BOSTON COMPUTER EXCHANGE CORP.

Used Equipment

Reconditioned Digital Equipment and Peripherals

Whatever your requirements are for Digital Equipment, call CSI *first!* Buying, selling, trading, leasing, cosignments - we do it all!

CSI sells all equipment with a 30 day unconditional guarantee on parts and labor and is ***eligible for DEC maintenance.***

Offering systems, disk drives, tape drives, printers, terminals, memory, options, boards, upgrades and many more.

CSI Compurex Systems, Inc.

One Cabot Place, Stoughton, MA 02072
In Mass. (617) 344-8600
FAX (617) 344-4199
Call toll-free 1-800-426-5499

HEWLETT · PACKARD

1000 • 3000 • 9000

Computers • Peripherals
Terminals

Buy • Sell • Rent • Lease

EURODATA INC.
2574 Sheffield Road
Ottawa, Canada K1B 3V7
613-745-0921
FAX: 613-745-1172

We Buy, Sell & Rent
Used WANG Systems & Parts
Overseas Inquires Welcome
Please Call Collect

Used WANG Specials

VS 85/90/100 1 MB Memory Board....$1995.
OIS 50....3495.
128K Memory Board (2200)....495.
VS15 & VS65 Users: 147MB Disk-Drive (Wang upgrade = UJ3298....3995.
2236 MXE (2200)....550.
2265 V-2 (288 MB) Disk Drive....4495.
VS5 & VS6 Users: 67MB Disk Drive-(Wang upgrade = UJ3440)....3495.

Norcomex Ltd.
34 Futurity Unit 17
Concord, ON L4K 1S6
(416) 738-0803
Telex: 06-988391 Fax: (416) 738-9013

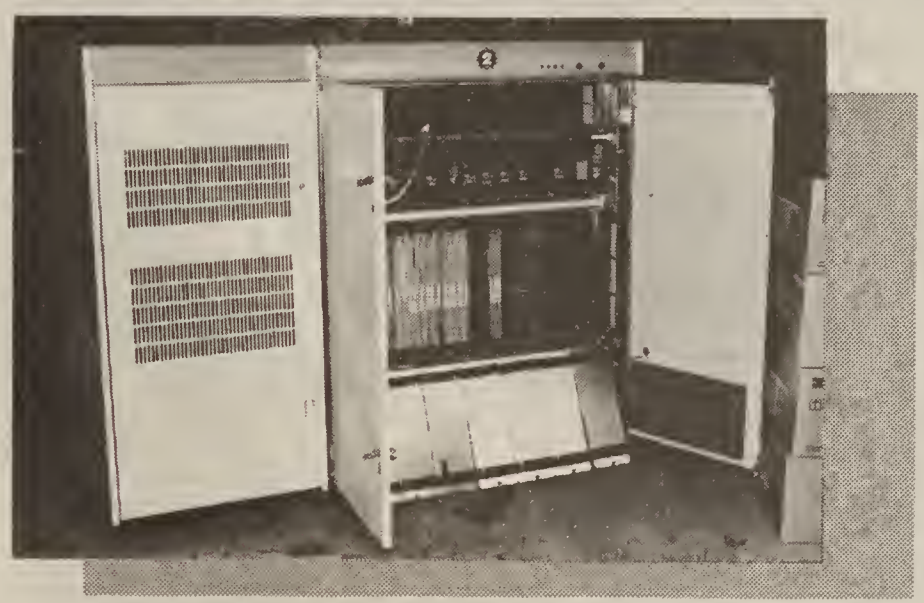
4341 - 4381

Buy - Sell - Lease
Trade-in

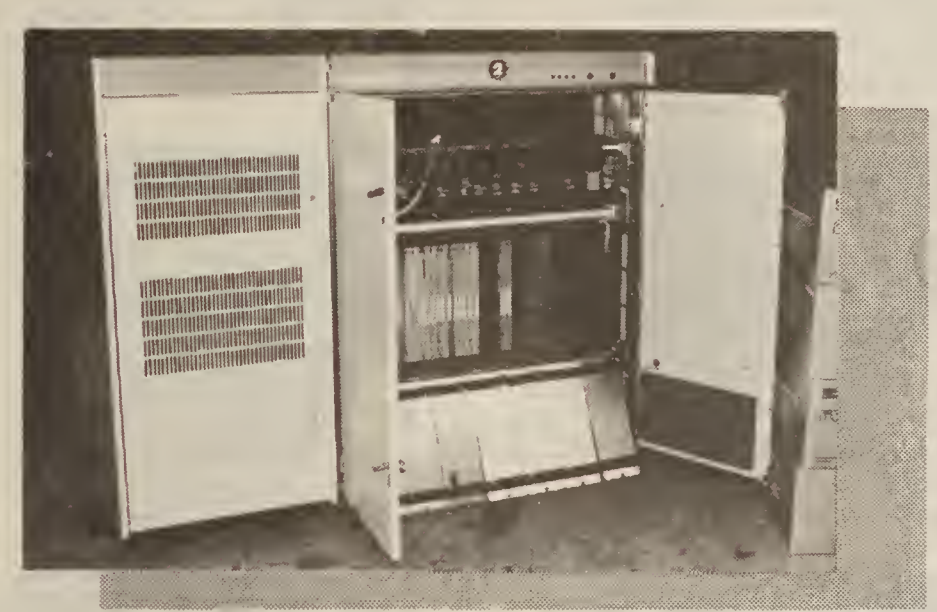
Systems and Peripherals

Hawkes Bay Computer
(702) 832-7744

New is for those who Depreciate...$$



Used is for those who Appreciate...$$



If you demand quality products at the right price with a history of proven performance, we're confident you'll appreciate our extensive inventory of USED...SURPLUS...and REMANUFACTURED D.E.C. and D.E.C. compatible equipment.

Whether you BUY, SELL, LEASE OR TRADE...We Guarantee.

...OEM certification and value
...A 10 day return option for a 100% credit
...That all your equipment is eligible for D.E.C. or appropriate third party maintenance at the time and site of installation.

And every product we sell is backed by Merida's comprehensive 90 day warranty.

Call today to receive our latest price list and to learn more about the advantages Merida provides.

MERIDA...Service is our strongest suit.

Merida TRADING GROUP

4C Gill Street
Woburn, MA 01801

(617) 933-6790
FAX 617-933-7884

*D.E.C. and Digital are registered trademarks of Digital Equipment Corporation

dda DIGITAL DEALERS ASSOCIATION

CDLA Member Computer Dealers & Lessors Association

Ready to ship to you immediately

3745-410 Serial #00580

We also offer 210's & 210 to 410 upgrades
Also: New and used (all models) 3725 & 372X

Distinctive Dataprocessing

"Communication Controller Specialist"

11419 Mathis • Suite 210 • Dallas, TX 75234
(214) 869-2214 • Fax (214) 869-1589

• We Love to Lease • GSA Approved

We buy, sell, lease & rent quality new and used equipment. And we stand behind it for a year.

TSV05 - AA 1600/3200 BPI Streaming Tape Drive w/Q-BUS Controller $5500.00

MICROVAX II BA123 6MB 1-8 User License $27,000.00

LP25-AA 300 LPM Printer $895.00
LP27-AA 1200 LPM Printer $9500.00
LA50-RA 100 Char/Sec 80 Col Printer $285.00

RA80-AA 121 MB Winches
Ter Disk Drive $2,700.00

MS630-BB 4MB Add On Memory for Microvax $1400.00
DSRVA-AA (Decserver 100) Terminal Server $2200.00

We pay CASH for New, Used and Obsolete Surplus Dec Equipment.

TRIDEX CORPORATION

Phone: 603-886-0383
Fax: 603-886-0914

375A WEST HOLLIS ST. NASHUA, NH 03061

Used Equipment

IBM....36, 38, 4300, 30XX

- BUY
- SELL
- LEASE (Short or Long Term)

UPGRADES
PRINTERS
CONTROLLERS
TAPES
DISKS
TERMINALS
FEATURES

ICS

CALL TOLL FREE
800 258-2233
IN CALIFORNIA
(714) 838-3717

INTERNATIONAL COMPUTER SALES, INC. • 515 E. 1st ST., SUITE A • TUSTIN, CA 92680

IF YOU'RE BUYING, WE'RE SELLING

IF YOU'RE SELLING, WE'RE BUYING
IBM SYSTEMS
Buy ● Sell ● Lease PERIPHERALS

(800) 331-8283
TOLL FREE

(213) 394-1561
CALIFORNIA

Ocean Computers, Inc.
919 Santa Monica Blvd., Ste. 200
Santa Monica, CA 90401

CDLA

PRIME

EXPERIENCED SYSTEMS AND PERIPHERALS

BUY-SELL-LEASE-BROKERAGE

NEW PLUG-COMPATIBLE DISK, TAPE, MEMORY

PLUS
THE FASTEST I/O AVAILABLE ANYWHERE

1ST SOLUTIONS, INC
11460 N CAVE CREEK ROAD
PHOENIX, AZ 85020
602-997-0997
ASK FOR DON SHIFRIS

Partial Listing — DATA GENERAL — Call for Prices

Systems	Memories/Options	Peripherals
MV 20000 MOD1	MV20000 4,8,16,32 MB	6161 S/S 147MB
MV 20000 MOD2	MV15000 4,8,16,32 MB	6160 S/S 73MB
MV 15000 MOD20	MV10000 2,4,8 MB	6214 S/S 602MB
MV 10000 8MB	MV8000 2MB	6061 S/S 192MB
MV 8000-II 8MB	S-140 250KB	6122 S/S 277MB
MV 8000 9300 Series	DESKTOP (All Sizes)	6329 120MB
MV 7800 4MB	ISC - 2	6236 S/S 354MB
MV 4000 DC Loaded	IAC - 16	6237 S/S 1.06GB
MV 4000 2MB	IAC - 8	6239 S/S 592MB
S-140 HFP, BMC	**Terminals**	6125 Streamer
Desktop All Mods	D200	6026 S/S 800/1600 BPI
System Upgrades	D211	6300 1600/6250 BPI
MV20000 Mod 1 to Mod 2	D215	4374 1200 LPM
MV15000 Mod 8 to Mod 20	D410	4373 890 LPM
MV15000 Mod 10 to Mod 20	D460	4327 300 LPM

International Computing Systems
Box 343 Hopkins, MN 55343
(612) 935-8112 FAX (612) 933-9664

WANTED: DEAD OR ALIVE - All DG Systems

DEC PDP-11
SYSTEMS & PERIPHERALS
BUY & SELL

THE One-Stop EXCHANGE!
- CPUS • TERMINALS
- DISC DRIVES • PRINTERS
- INTERFACES, ETC.

dce DIGITAL COMPUTER EXCHANGE INC
27773 Industrial Blvd., Hayward, CA 94545
FAX (415) 887-5590 TLX 709536

Call (415) 887-3100

HP 3000

ATP's • S/70
7937H • 7933H

Available in Quantity

Processors • Peripherals
Systems

All In Stock - Immediate Delivery

All warranted to qualify for manufacturer's maintenance

BUY • SELL • TRADE
RENT • LEASE

ConAm Corporation
It's Performance That Counts!
800/643-4954 213/829-2277

IBM Unit Record Equipment

Data Modules/Disk Packs
Magnetic Tape/Diskettes

029-082-083-084-085-088
129-514-519-548-557-188

2316-3336(1)&(11)-3348(70)
80-200-300 MB
Disk Packs

Thomas Computer Corp.
5633 W. Howard Chicago IL 60648
800-621-3906 312-647-0880

WANTED

OBSOLETE COMPUTER EQUIPMENT

Top Cash Paid

We purchase all types of obsolete or excess computer equipment and peripherals. We pay costs for all shipments as well as top prices.

Call today for a quote on your system.

COMPU-SCRAP, Inc.
Randolph, MA 02368
(617) 341-2695
Call Collect!

IBM/MEMOREX

Buy Sell Lease

Specializing in Communications

Coastal Computer Consultants Corp.
48 Central St
P.O. Box 1530
Manchester-by-the-sea, MA 01944
(617) 526-4301

FOR SALE
STRATUS FT-200

- 4 mb Duplexed
- Priam Disks
- Tape Drive
- 600 lpm Printer
- 63 Ports
- 20 Terminals
- Under Maintenance

Original Price $289,090
Sell for $30,000
(518) 283-8682

USED EQUIPMENT
EXCELLENT CONDITION

CALCOMP 1077 diagonal PCI dual load pin plotter
CALCOMP 9000 digitizer fully equipped
CALCOMP 25180 digitizer
200 sq. feet computer flooring

CONTACT:
K.J. O'Halloran
(214) 954-0475

COMPUTERWORLD's Product Classified
MARKETPLACE
Examines the issues while Computer Professionals examine your message.
Call for all the details
(201) 967-1358 (508) 620-7784
(508) 620-7759 (508) 620-7758

Your used computer equipment deserves a second chance

If you have used computer equipment to sell, *Computerworld's* product classified Marketplace is the best place to do your selling. That's because Marketplace features a Used Equipment section to help you market your equipment to the very people who are looking to buy.

And when you advertise in *Computerworld* Marketplace, you reach a total (ABC-audited) audience of over 612,000 computer professionals who turn to *Computerworld* for news, information, features - and Marketplace - every week.

So give your used computer equipment a second chance today. Call 800/343-6474 (in MA, 508/879-0700) to reserve your space.

COMPUTERWORLD
MARKETPLACE PAGES
Where all computer buyers and sellers can go to market.

Used Equipment

9370
CLEARANCE

9375-60
9335-A01
9335-B01
9347-001

ASKING 55% OF LIST
Call Hal Carroll

CA 408-241-3677

(800)426-4381
MARKETEX

$ SAVE $
IBM DISPLAYWRITERS
36'S, 38'S
OTC
240-400-600 LPM
(IBM compatible from $2,900)
* IBM * DEC * WANG * XEROX
Printers, Terminals, CPU's & DISKS
LRK RESOURCES UNLTD INC.
ascd member 713-437-7379
FAX 713 437-4945 800-523-8903

You Have 12 Ways To Advertise Your Products In The MARKETPLACE It's Computerworld's Product Classified

MARKETPLACE

Featuring:

- ☐ PC Products
- ☐ Used Equipment
- ☐ Software
- ☐ Rental & Leasing
- ☐ Supplies
- ☐ Training
- ☐ Conversions
- ☐ Hardware
- ☐ Communications Equipment
- ☐ Time & Services
- ☐ Bids & Proposals
- ☐ Financial Business Services

Reach over 612,000 Information Systems Professionals by placing your ad in the MARKETPLACE.

Name:_____
Title:_____
Company:_____
Address:_____
City:_____
State:_____ Zip:_____

☐ I am enclosing ad material with this form.

Ad size:

_____ columns wide x _____ inches deep.

Return this form and advertising material to:

Computerworld Product Classified Marketplace
375 Cochituate Road, Box 9171
Framingham, MA 01701-9171
or call a representative today for all the details:
(201) 967-1358
(617) 879-0700

IBM **BUY · SELL · LEASE**

Member Computer Dealers & Lessors Association
CDLA

SYSTEM 36/38
43XX 30XX
AS/400
AT&T VOICE SYSTEMS
SERIES 1

- Processors
- Peripherals
- Upgrades

DEMPSEY & ASSOCIATES INC.

18377 Beach Blvd., Suite 323
Huntington Beach, CA 92648 (714) 847-8486

(800) 888-2000

Donate Your Unneeded Computer Equipment and get a 100% Tax Write Off

The National Vitiligo Foundation needs your help. Donate your unneeded computer equipment to the foundation and receive its full value as a tax write off. The foundation in turn will sell the equipment for badly needed funds to help those afflicted with this incurable disease. Complete proof of what the equipment is worth will be sent to you in writing. Best of all, those who have Vitiligo will be given hope. Please help us to help others and help yourself in return. Call today!

Call Collect 617-784-1999

NATIONAL VITILIGO FOUNDATION, INC.
Sharon, MA 02067

IBM SPECIALISTS

SELL • LEASE • BUY
S/34 S/36 S/38 AS/400
3741 3742

- New and Used
- All Peripherals
- Upgrades and Features
- IBM Maintenance Guaranteed
- Immediate Delivery
- Completely Refurbished

800-251-2670
IN TENNESSEE (615) 847-4031

ascd AMERICAN SOCIETY OF COMPUTER DEALERS

CMA
COMPUTER MARKETING of America, Inc.
PO BOX 71 • 610 BRYAN STREET • OLD HICKORY, TENNESSEE 37138

Used Equipment

BUY OR SELL NEW OR USED

IBM PC * XT * AT * PS/2
COMPAQ * HP * AT&T * WANG
MACINTOSH * APPLE 2

1-800-262-6399

Boston Computer Exchange Corporation
MA 617-542-4414
FAX 617-542-8849

HONEYWELL

LEVEL 6 DPS 6 SERIES 16

- Complete Minicomputer Line New & Used
- All Peripherals and Terminals
- Upgrades and Features
- Depot Repair Capability
- Honeywell Maintenance Guaranteed
- Immediate Delivery Low Prices
- HDS 5 and HDS 7 Compatible Terminals

The Recognized Leader in Honeywell Minicomputer Sales and Support

BCS

BOUDREAU COMPUTER SERVICES
100 Bearfoot Road.
Northboro, MA 01532
(508) 393-6839
FAX 508-393-3781

IBM MAINFRAMES
3084 3081

Sale by End User
Call for Configurations and Availability Dates
All Equipment IBM Maintained
Contact:
Ralph Taylor
(415) 823-1376

Carlson Computer International
3534 E. Sunshine, Ste. H
Springfield, MO 65804-2924
TEL. 417-887-1907 FAX # 417-887-2305
BUYER • SELLER • RENTOR
LEASOR • TRADER of DEC Equipment
"We love to spend money buying DEC equipment."

MEMORY CHIP SHORTAGE
For a limited time, we are actively buying excess, surplus, or unused memory boards; all brands. Call for top dollar.

dda DIGITAL DEALERS ASSOCIATION

WANG
Buy-Sell or Trade
VS PC MVP OIS
Systems In Inventory
VS 7150 / 100 / 85 / 65 / 6 / 5
And Peripherals
4230A ● 4230 ● LPS-8 ● 2256C
PC/AT *WORKSTATIONS
Genesis Equipment Marketing
Phone (602) 277-8230
Fax (602) 234-0613
* AT is a registered trademark of I.B.M.

BUY, SELL LEASE IBM CPU's
3090 - 400 E, 4381 - PO2
3081 - D, G, K 3089 - 001
Pillar Silent Blocks
GTEX Financial Group
(214) 783-1212

USE YOUR COMPUTER TO LEARN
Your computer and modem are your passports to an expanding world of learning. Experience the special student/teacher relationships that emerge in the electronic classroom. Study at your convenience to improve your information technology skills. Introductory classes forming now. For additional information with no obligation call:
1-800-441-ISIM
THE INTERNATIONAL SCHOOL OF INFORMATION MANAGEMENT

WORD PROCESSING
IBM Displaywriters
5525 — OFFICE SYSTEMS
5219 — 5253 — 5258
6670 PRINTERS
SYSTEM/34/36
WANG — NBI — PC'S
CDB FINANCIAL, INC.
3520 DILIDO ROAD
DALLAS, TEXAS 75228
800-648-6791
214-324-3491
Member: CDLA

FOR LEASE
IBM
4381
R 24
ASK FOR MIKE DEXLER
New York Systems Exchange
Melville, New York
CDLA Member Computer Dealers & Lessors Association
Area Code: 516
673-3830

READ ALL ABOUT IT!
- Closing Prices on New & Used Equipment
- Fair Market Value Data
- Computer and Software Training
- Computerworld MARKETPLACE

(201)-967-1358
(508)-620-7759
(508)-620-7784

Education

Programmers Tools

FREE BUYER'S GUIDE
When you need programmer's development tools, Programmer's Connection is your best one-stop source. We are an independent dealer representing more than 300 manufacturers with over 800 software products for IBM personal computers and compatibles including: COBOL compilers and utilities, relational databases, and much more. Call today to receive a **FREE** comprehensive Buyer's Guide, and find out why Programmer's Connection is your best connection for software tools.

Programmer's Connection
7249 Whipple Ave NW
North Canton, Ohio 44720
US 800-336-1166
Canada 800-225-1166
OH & AK (Collect) 216-494-3781
FAX 216-494-5260
Telex 9102406879
International 216-494-3781

Tape Testing

CALIFORNIA 13,000 DP SITES
We divide our list into 3 areas: LA County, So. Calif. and No. Calif. (available 1/89). Price: $325 each.
The company name, address, DP executive's name, title, phone no., and the type of hardware installed is profiled.
Each list is available on labels or in book form either alphabetically or by city or zip code — it's your choice. We guarantee accuracy, since every day 130 sites are updated until at 6 months we call site No. 1 again. As a result, we only print after we receive your order to give you the most current list available in the industry. Delivery: One week.
PHOENIX COMPUTER SERVICE
8949 Reseda Blvd., #107
Northridge, CA 91324
(818) 349-0762

Your used computer equipment deserves a second chance.

If you have used computer equipment to sell, *Computerworld's* product classified Marketplace is the best place to do your selling. That's because Marketplace features a Used Equipment section to help you market your equipment to the very people who are looking to buy.

And when you advertise in *Computerworld* Marketplace, you reach a total (ABC-audited) audience of over 612,000 computer professionals who turn to *Computerworld* for news, information, features — and Marketplace — every week.

So give your used computer equipment a second chance today. Call 800/343-6474 (in MA, 508/879-0700) to reserve your space.

COMPUTERWORLD MARKETPLACE PAGES
Where all computer buyers and sellers can go to market.

It's the Computerworld *MARKETPLACE*

Reach Information Systems Professionals Where They Shop

- ☐ PC Products
- ☐ Conversions
- ☐ Used Equipment
- ☐ Hardware
- ☐ Software
- ☐ Communications Equipment
- ☐ Rental & Leasing
- ☐ Time & Services
- ☐ Supplies
- ☐ Bids & Proposals
- ☐ Acquisitions
- ☐ Training
- ☐ Desktop Publishing
- ☐ Productivity Tools

CALL NOW
800-343-7464

Supplies

Inflation Fighters

Quality & Savings

Slightly used, Money Back Guarantee. Full Reels. All External Labels Removed Guaranteed for use at 1600 BPI through 6250 BPI.

2400' Reel **$4.95 ea.**
1200' Reel **$4.50 ea.**
600' Reel **$3.75 ea.**

All Tapes with Hanging Seals

We pay freight on orders over 200 tapes. All orders shipped within 48 hours.

Call or Write
Computer Tape Mart
44A Seabro Avenue
N. Amityville, New York 11701
[516] 842-8512

Rental & Leasing

BURROUGHS
UNISYS

B20 - B7000

A Series - V Series

All Peripherals

Low Lease Rates

Depot Maintenance

LDI/
COMPUTER PROVISIONS CORPORATION

(216) 687-0307

VAX RENTALS

MV 3500/3600
MICROVAX II
VAX 6000 SERIES
VAX 8000 SERIES
Systems & Peripherals

- Fast Turnaround
- Dependable Products
- Upgrade/Add-On Flexibility

6 Months ● 12 Months ● 36 Months

BROOKVALE ASSOCIATES
dba Digital Dealers Association

EAST COAST (516) 273-7777 WEST COAST (206) 392-9878

We Buy & Sell
DEC
Systems
Components

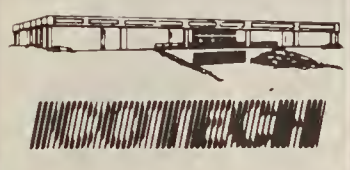
Digital Computer Resale
call:713 445-0082
600 Kenrick Ste C22
Houston, Tx 77060

Time & Services

ON-LINE WITH COMPUSOURCE

- Multiple centers
- MVS, VM, DOS
- RACF, CICS, IMS
- Decision support software including SAS
- Volume and term discounts
- Worldwide access
- Full technical support
- Laser printing
- Disaster recovery services

COMPUSOURCE
(919) 469-3325



Innovative Computer Techniques

COMPUTER SERVICES
IBM 3084

● Batch Processing ● Public Network Access
● Timesharing ● Laser Printing

Route 202, Raritan, N.J. 08869
201-685-3400
Contact: Joyce Bogaenko

ATAC
BUSINESS SERVICES

PRIME/IBM
Computer Services

PRIME "HOT SITE"

call Lee Roppongi
(415) 961-9795

COMPUTING SERVICES

MVS/XA VM/370 DOS/VSE
CICS TSO CMS
DB2 IMS/DBDC 4GL SAS

MULTIPLE CPUs - 50+ MIPS

TELENET, TYMNET
IBM INFORMATION NETWORK

DEDICATED SYSTEMS AVAILABLE

GIS
INFORMATION SYSTEMS, INC.
815 COMMERCE DRIVE
OAK BROOK, IL 60521
312-574-3636

EVENING COMPUTER SERVICES AVAILABLE

MVS / XA
3090 - 400E

BATCH/TSO/IMS/CICS

Extensive Networking Capabilities

For More Information Call:

Charles Green
(315) 432-6245
or write to:

UNITED TECHNOLOGIES CARRIER
P. O. Box 4808
Syracuse, New York 13221

UNITED TECHNOLOGIES CARRIER

DEC CONVERSIONS

VAX	RSX	RT	RSTS	IBM	PC

TAPE	DISK
800	RL02
1650	RX01
6250	RX02
CARTRIDGE	FLOPPIES
TK50	360K
TU58	1.2M

MEDCOM Info Systems, Inc.
Ask For Bob (714) 998-8520

Desktop Publishing

STOP PAYING PRINTERS FEES

We will put together the system you need at a price you can't beat.

medcom Information Systems Inc
6312 E. Santa Ana Canyon Rd, Suite 361
Anaheim Hills, CA 92807
Ask For Bob (714) 998-8520

FREE ad creation and typesetting for your Computerworld Marketplace ad.

Call Cindy Delany, Operations Manager, at 800-343-6474, ext. 719 (in Massachusetts, 508-879-0700, ext. 719) for complete details.

Conversions

AS 400 CONVERSIONS

Conversion Specialists

Automatic Translation

Extensive Background in System 36 & 38

NEOSYNETICS, INC.
3158 Des Plaines Avenue
Des Plaines, Illinois 60018
312/299-0900

VAX TIME

5¢ PER CPU SECOND
OR
$800.00 PER MONTH FIXED RATE

- MOST MAJOR LANGUAGES
- PROGRAMMING AVAILABLE
- NATIONWIDE ACCESS

medcom Information Systems, Inc
Ask for Bob at (714) 998-8520

The Computerworld
MARKETPLACE
Reach Over 612,000 Computer Professionals When They Reach For
COMPUTERWORLD!
(508) 879-0700
(201) 967-1358

Educate your customers through Computerworld Marketplace's training section.

10/10 Dealing with budget cuts.

10/24 How much to spend on technical training?

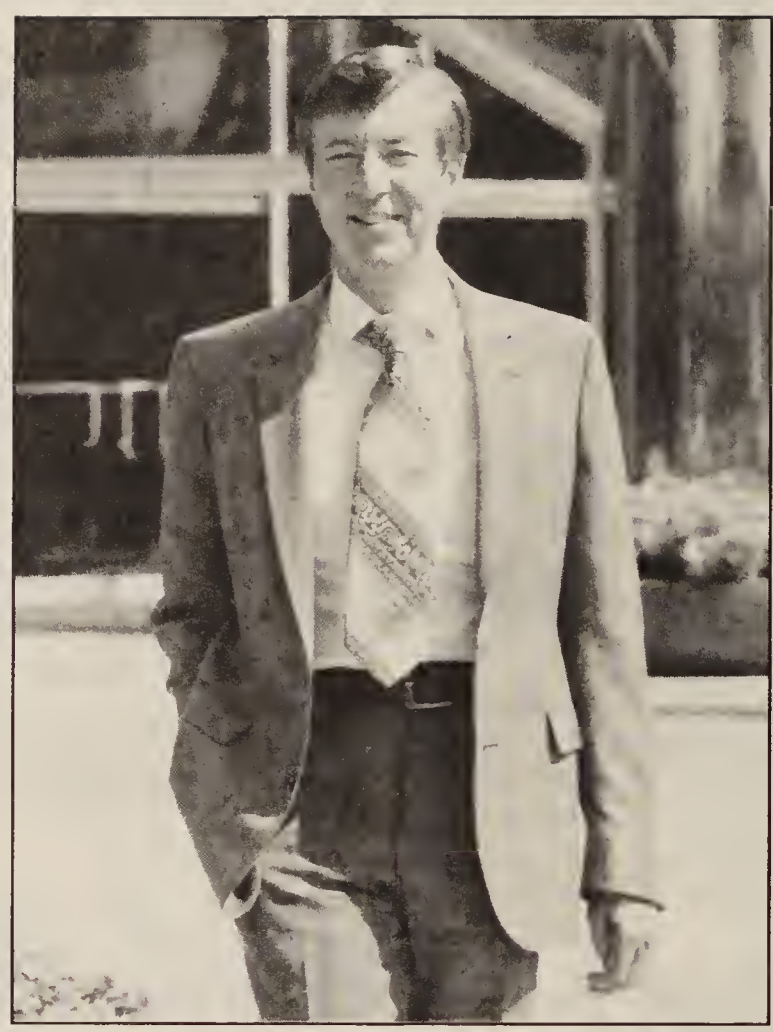
11/7 Setting prices on in-house courses.

11/21 What do systems pros need to know about business?

For more information call

800 343-6474
Ext. 794

COMPUTERWORLD
MARKETPLACE PAGES
Where all computer buyers and sellers can go to market.



"In six weeks Computerworld Marketplace pulled customers I otherwise couldn't have gotten to in six years."

— Chuck Youngblood
President
Mountain Marketing

At Mountain Marketing, based in Houston, Texas, company president Chuck Youngblood looks at computers from the ground up. That's because he's in the business of buying, selling and installing the special raised flooring, power sources and climate control equipment necessary to putting together a data center.

So when a company sets out to build a computer room, Mountain Marketing helps by supplying these used — and often hard-to-find — components. Through advertising, Chuck searches much of the country for the necessary used equipment. And he's made a similarly thorough search to find the right advertising vehicle.

"We design and furnish data centers and computer sites. What makes us different is the fact that we deal in used equipment only. That means our customers can save as much as 45 or 50 percent.

"We get this equipment mostly from companies that relocate. And the way we find it is the same way we resell it — through our ads in *Computerworld* Marketplace. While those ads help us to buy as well as sell, I'm really tickled by the way they've delivered new customers to us.

"In six weeks *Computerworld* Marketplace pulled customers I otherwise couldn't have gotten to in six years. No other publication has delivered the kind of valuable customers Marketplace has.

"In fact, I've talked to enough customers who've told me they read only *Computerworld* — which is why I cancelled every other publication to run exclusively in *Computerworld*. And after the results I've seen, I'm glad I did."

Computerworld Marketplace. We're helping more computer professionals buy, sell and lease products and services. We're the exclusive choice of Mountain Marketing. And we can be your choice as well.

For all the facts, call Debbie Eisenberg, *Computerworld* Marketplace Sales Director, at (201) 967-1358.

COMPUTERWORLD
MARKETPLACE PAGES

Where all computer buyers and sellers can go to market.

Computerworld is an IDG Communications Newspaper

COMPUTERWORLD

SALES OFFICES

Publisher/Fritz Landmann

Vice President/Associate Publisher/Val Landi, **COMPUTERWORLD**, 375 Cochituate Road, Box 9171, Framingham, MA 01701-9171, (508) 879-0700

BOSTON: Northern Regional Director/David Peterson, **District Managers**/Bill Cadigan, Sherry Driscoll, John Watts, **Sales Assistants**/Alice Longley, Lisa Bonaccorso, Paula Wright, **COMPUTERWORLD**, 375 Cochituate Road, Box 9171, Framingham, MA 01701-9171 (508) 879-0700

CHICAGO: Eastern Regional Director/Bernie Hockswender, **Midwest Regional Manager**/Kevin McPherson, **District Manager**/Larry Craven, **Sales Assistants**/Kathy Sullivant, Karol Lange, **COMPUTERWORLD**, 10400 West Higgins Road, Suite 300, Rosemont, IL 60018, (312) 827-4433

NEW YORK: Eastern Regional Director/Bernie Hockswender, **District Managers**/Fred Lo Sapio, Frank Genovese, **Sales Assistant**/Linda Pipines, **COMPUTERWORLD**, Paramus Plaza I, 140 Route 17 North, Paramus, NJ 07652 (201) 967-1350

LOS ANGELES: Western U.S Director/Jan Harper, **Southwestern Regional Manager**/Carolyn Knox, **District Manager**/Darren K. Ford, **Sales Assistant**/Bev Raus, **COMPUTERWORLD**, 18004 Sky Park Circle, Suite 255, Irvine, CA 92714 (714) 261-1230

SAN FRANCISCO: Western U.S Director/Jan Harper, **Senior District Manager**/Ernie Chamberlain, **District Managers**/Michela O'Connor, Alicia Sanbalis, **Sales Assistants**/Robert Condensa, Nurit Zekman, **COMPUTERWORLD**, 500 Airport Boulevard, Suite 400, Burlingame, CA 94010 (415) 347-0555

ATLANTA: Eastern Regional Director/Bernie Hockswender, **Southeastern Regional Manager**/Kevin C. Harold, **Account Manager**/Melissa Christie, **Sales Assistant**/Debra Brown, **COMPUTERWORLD**, 1400 Lake Hearn Drive, Suite 330, Atlanta, GA 30319 (404) 394-0758

DALLAS: Eastern Regional Director/Bernie Hockswender, **Southeastern Regional Manager**/Kevin C. Harold, **Sales Assistant**/Brenda Shipman, **COMPUTERWORLD**, 14651 Dallas Parkway, Suite 304, Dallas, TX 75240 (214) 233-0882

WASHINGTON, D.C.: Eastern Regional Director/Bernie Hockswender, **District Manager**/Paula Smith, **COMPUTERWORLD**, Paramus Plaza I, 140 Route 17 North, Paramus, NJ 07652 (201) 967-1350

PRODUCT CLASSIFIED ADVERTISING: Product Classified Advertising Director/Eastern Account Manager/Debbie Eisenberg, Paramus Plaza I, 140 Route 17 North, Paramus, NJ 07652 (201) 967-1350

Midwest Account Manager/Marie Keyes, 375 Cochituate Rd., Box 9171, Framingham, MA 01701-9171, (508) 879-0700

New England Account Manager/Paul Bonarrigo, 375 Cochituate Road, Box 9171, Framingham, MA 01701-9171 (508) 879-0700

Western Account Manager/Karen Massimino, 375 Cochituate Road, Box 9171, Framingham, MA 01701-9171 (508) 879-0700

RECRUITMENT ADVERTISING: National Recruitment Sales Director/John Corrigan, 375 Cochituate Road, Box 9171, Framingham, MA 01701-9171 (508) 879-0700

RECRUITMENT ADVERTISING SALES OFFICES:
New England Recruitment Manager/Al DeMille, 375 Cochituate Road, Box 9171, Framingham, MA 01701-9171 (508) 879-0700

Mid-Atlantic Recruitment Manager/Warren Kolber, Paramus Plaza 1, 140 Route 17 North, Paramus, NJ 07652 (201) 967-1350

Midwest Recruitment Manager/Patricia Powers, O'Hare Corporate Tower One, 10400 West Higgins Road, Suite 300, Rosemont, IL 60018 (312) 827-4433

Western Recruitment Manager/Barbara Murphy, 18004 Skypark Circle, Suite 100, Irvine, CA 92714 (714) 250-0164

South-Atlantic Recruitment Manager/Kathryn Kress, 3022 Javier Road, Suite 210, Fairfax, VA 22031 (703) 573-4115

Recruitment Account Executives: New England/Nancy Percival, **Mid-Atlantic**/Jay Novack, **South-Atlantic**/Pauline Smith, **Midwest**/Ellen Casey, **Western**/Chris Glenn, 1-800-343-6474 or (508) 879-0700

IDG INTERNATIONAL MARKETING SERVICES: Managing Director/Frank Cutitta, **COMPUTERWORLD**, 375 Cochituate Road, Box 9171, Framingham, MA 01701-9171 (508) 879-0700

West Coast Marketing Manager/Leslie Barner, 3350 West Bayshore Road, Suite 201, Palo Alto, CA 94303 (415) 424-1001

CW PUBLISHING/INC.

An IDG Communications Company

Fritz Landmann/**President**

Computerworld Headquarters: 375 Cochituate Road, P.O. Box 9171, Framingham, MA 01701-9171
Phone: 508-879-0700, Telex: 95-1153, FAX: 508-875-8931

Vice President/Associate Publisher, Val Landi
OPERATIONS Vice President/Operations, Matthew Smith. **Business Manager**, Mark Sullivan.
SALES Advertising Director, Carolyn Novack. **National Recruitment Sales Director**, John Corrigan.
Display Advertising Production Manager, Maureen Carter. **Product Classified Operations Director**, Anne E. Hadley.
Classified Operations Manager, Cynthia Delany.
MARKETING Vice President Marketing & Circulation, Jack Edmonston. **Marketing Communications Director**, Jan Bell.
Marketing Services Director, Audrey Shohan. **Manager/Marketing Communications**, Mary Doyle.
CIRCULATION Vice President Marketing & Circulation, Jack Edmonston.
Director of Circulation Management, Maureen Burke. **Director of Circulation Promotion**, Carol Spach.
PRODUCTION Production Director, Leigh Hometh. **Assistant Production Director**, Carol Polack.
Production Manager, Beverly Wolff. **Art Director**, Tom Monahan.

FOREIGN EDITORIAL/SALES OFFICES

Argentina: Ruben Argento, CW Communicaciones S/A, Av. Belgrano 406-Piso 9, CP 1092 Buenos Aires. Phone: (011) 54 134-5583. Telex: (390) 22644 (BAZAN AR).

Asia: S.W. Chan, Asian Computerworld Communications Ltd., 701-4 Kam Chung Bldg., 54 Jaffe Road, Wanchai, Hong Kong, Phone: (011) 852 5 861 3238. Telex: (780) 72B27 (COMWOR HX). FAX: (011) 852 5 86 10953.

Australia: Alan Power, Computerworld Pty. Ltd., 37-43 Alexander Street, Crows Nest, NSW 2065. Phone: (011) 61 2 4395133. Telex: (790) AA74752 (COMWOR). FAX: (011) 61 2 439 5512.

Austria: Manfred Weiss, CW Publikationen Verlags Ges.m.b.H., Zieglergasse 6, A-1070 Wien, Austria. Phone: (011) 43-93-16-31-0 or (011) 43-93-05-08-0. Telex: 115542 SCH/A. FAX: (011) 43-93-05-08-33.

Brazil: Ney Kruel, Computerworld do Brazil Ltda, Praca Floriano, 19/26 Andar, CEP:20031 Rio de Janiero. Phone: (011) 55 21 240 8225. Telex: (391) 21 30830 BR.

Denmark: Preben Engell, Computerworld Danmark A/S, Torvegade 52, 1400 Copenhagen K, Denmark. Phone: (011) 45 1955 695. Telex: (B55) 31566. FAX: (011) 45 154 56 14.

France: Francois Chaussonniere, Computerworld Communications S.A., 185 Avenue Charles De Gaulle, 92200 Neuilly Sur Seine, France. Phone: (011) 33 14 747 1272. Telex: (842) 613234 F. FAX: (011) 33 14 241552.

Hungary: Dezso Futasz, Computerworld Informatika Co., Kft. Pf. 386, 1536 Budapest, Hungary, Phone: (011) 36 1 228 458. Telex: (861) 22 6307 (KSH H).

Italy: Umberto Costamagna, Computer Publishing Group S.R.L., Via Vida 7, 20127 Milano, Italy. Phone: (011) 39-2-2613432. Telex: (843) 335318. FAX: (011) 39 2 282 0886.

Japan: Dick Yamashita, Computerworld Japan, Akasaka Omotemachi Bldg., Minato-Ku, Tokyo 107. Phone: (011) 81 3 551 3882. Telex: (781) 252-4217. FAX: (011) 81 3 582 7239.

M. Nakamura, IDG Communications, Japan, c/o Marcom International, Inc., Akasaka Center Building, 1-3-12 Motoakasaka, Minato-ku, Tokyo 107, Japan. Phone: (011) 81 3 403-8515. Telex: (781) J27941 (reps for all CW Publishing publications except Computerworld Japan).

Mexico: Henry Morales, Computerworld Mexico S.A. de C.V., Oaxaca 21-2, Mexico City 7 D.F. Colonia Roma, 06700 Mexico. Phone: (905) 514 4218 or 6309. Telex: (383) 177 1300 (ACHAME).

The Netherlands: Wout Berends, CW Communications B.V., van Eeghenstraat 84, 1071 GK Amsterdam, The Netherlands. Phone: (011) 31 20 646426. Telex: (844) 18242 (CWCOM NL).

New Zealand: Martin Taylor, Computerworld Communications Ltd., 2nd Floor, 15 Augustus Terrace, Parnell, Auckland, New Zealand. Phone: (011) 64-9-779-902. Fax: (011) 64 9 774 604.

Norway: Morten Hansen, CW Norge A/S, Hovinveien 43, 0576, Oslo 5, Norway. Phone: (011) 472 647725. Telex: (856) 76476 (CW NOR N). FAX: (011) 47 268 0152.

People's Republic of China: Chen Mingkun, China Computerworld, 74 Lu Gu Road, Box 750, Beijing 100039, People's Republic of China. Phone: (011) 47 814 0044. Telex: (716) 222214 (CCW CN).

Spain: Paco Zabala, CW Communications, S.A., Rafael Calvo, 18, 4B, 28010 Madrid, Spain. Phone: (011) 34 1 419 4014. Telex: (831) 45522 (CW E). FAX: (011) 341 419 61 04.

Sweden: Bengt Mamfeldt, CW Communications AB, Sodra Hamnvagen 22, S-115 41 Stockholm, Sweden. Phone: (011) 46 8 67 91 80. Telex: (854) 14904 9 (NOVACW). FAX: (011) 46 8 65 3132.

Switzerland: Gebhard Osterwalder, CW Publikationen AG, Witikonerstrasse no. 15, Postfach 253, CH - 8030 Zurich, Switzerland. Phone: (011) 41 1 55 10 77. Telex: (845) 816 710 (CWCI CH). FAX: (011) 41 1 55 1135.

Taiwan: Leona Wang, ACE Media Agency Co. Ltd., P.O. Box 26-578, Room 503#1, Fu Hsin, S. Road Sec 1, Taipei, Taiwan, R.O.C. Phone: (011) 886 2 721 4302. Telex: (785) 14142 (ACE GROUP). (Representative for all CWCI publications). FAX: (011) 886 2 731 0420.

London: Martin Durham, CW Communications Ltd., 99 Grays Inn Rd., London, WC1 8UT, United Kingdom. Phone: (011) 44 1 831 9252. Telex: (851) 262346 (THEPUB G). FAX: (011) 44 1 405 2347.

United Kingdom: Euan Rose, Beere Hobson & Associates, 34 Warwick Road, Kenilworth, Warwickshire, CV8 1HE, United Kingdom. Phone: (011) 44 926 512424. Telex: (851) 311951 (BEEHOB). (Representative for all CWCI publications). FAX: (011) 44 926 512948.

Venezuela: Kalman von Vajna Nagy, CW Comunicaciones, C.R.L. Tore Maracaibo, Piso 13, Oficina H, Av. Libertador, Caracas, Venezuela. Phone: (011) 58 2 72 76 30. FAX: (011) 58 2 724970.

West Germany: Eckhard Utpadel, CW Publikationen Verlagsgesellschaft mbH, Rheinstrasse 26/28, Postfach 40 0429, 8000 Munich 40, West Germany. Phone: (011) 49 89 360860. Telex: (841) 5215350. (COMW D). FAX: (011) 49 89 3 60 86109.

IDG COMMUNICATIONS/INC.

Patrick J. McGovern	Axel Leblois	William P. Murphy
Board Chairman	**Chief Executive Officer**	**Vice President/Finance**

Computerworld is a publication of IDG Communications, the world's largest publisher of computer-related information. IDG Communications publishes over 90 computer publications in 33 countries. Fourteen million people read one or more IDG Communications publications each month. IDG Communications publications contribute to the IDG News Service offering the latest on domestic and international computer news. IDG Communications publications include: ARGENTINA'S *Computerworld Argentina;* ASIA'S *Communications World, Computerworld Hong Kong, Computerworld Southeast Asia, PC Review;* AUSTRALIA'S *Computerworld Australia, Communications World, Australian PC World, Australian Macworld;* AUSTRIA'S *Computerwelt Desterreich;* BRAZIL'S *DataNews, PC Mundo, Micro Mundo;* CANADA'S *Computer Data;* CHILE'S *Informatica, Computacion Personal;* DENMARK'S *Computerworld Danmark, PC World Danmark, CAD/CAM World;* FINLAND'S *Mikro, Tietovikko;* FRANCE'S *Le Monde Informatique, Distributique, InfoPC, Telecoms International;* GREECE'S *Computer Age;* HUNGARY'S *Computerworld SZT, PC Mikrovilag;* INDIA'S *Dataquest, PC World India;* ISRAEL'S *People & Computers Monthly, People & Computers Weekly, SBM Monthly;* ITALY'S *Computerworld Italia;* JAPAN'S *Computerworld Japan, Semicon News;* MEXICO'S *Computerworld Mexico, PC Journal;* THE NETHERLANDS' *Computerworld Netherlands, PC World Benelux;* NEW ZEALAND'S *Computerworld New Zealand, Computerworld Norge, PC World Norge;* PEOPLE'S REPUBLIC OF CHINA'S *China Computerworld, China Computerworld Monthly;* SAUDI ARABIA'S *Arabian Computer News;* SOUTH KOREA'S *Computerworld Korea, PC World Korea;* SPAIN'S *Cimworld, Computerworld Espana, Commodore World, PC World Espana, Comunicaciones World;* SWEDEN'S *Computer Sweden, MikroDatorn, Svenska PC World;* SWITZERLAND'S Computerworld Schweiz; UNITED KINGDOM'S *Computer News, ICL Today, Lotus, PC Business World;* UNITED STATES' *Amiga World, CD-ROM Review, CID, Computer Currents, Computerworld, Digital News, Federal Computer Week, 80 Micro, Focus Publications, InCider, InfoWorld, Macintosh Today, Macworld, Computer + Software News (Micro Marketworld/Lebhar-Friedman), Network World, PC Letter, PC World, Portable Computer Review, Publish!, PC Resource, Run;* VENEZUELA'S *Computerworld Venezuela;* WEST GERMANY'S *Computerwoche, Information Management, PC Welt, PCWoche, Run/Run Specials.*

ADVERTISERS INDEX

AI Corp. 28
Alcatel Business Systems 20-21
Aluminum Case 92
Amdahl EPS 19
Applied Relational Technology, A Division of VM Software, Inc. 10
AST Research 67
AT&T 50-51,102-103

Bennett Software 111,113
B.I. Moyle & Associates 25
BMC Software 104-105

Chinon America 60
Cincom Systems 46
Command Technology Corporation 49
Communication Networks '89 ..... 52/53
Compaq Computer 108/109
Computer Associates 31,33,35,37,39,41,108
Computer Task Group 16
Cullinet Software 68-69
CW Campus Recruitment 110
CW Circulation 112
CW IBM EXTRA 53
CW Marketplace 98,99,130

Data Base Management Inc. 98
Data General 40
Datapoint Corp. 64

Eastman Kodak 30
Ellis Computing 10
Epson America 42-43

Fujitsu Data Products 36

Hands-on-Learning 108
Hughes Aircraft 86
Hyundai Electronics 80-81

IBM 78-79
IDEAssociates 44

Innovation Data Processing 5
Interface Group 94
Interlink Computer Sciences, Inc. 61

Landmark Systems 58,100
Leasametric 18

McCormack & Dodge 17
Micom Systems 99
Micro Focus 45
Morino Associates 48
MSA C4
Multi-Tech Systems 59

Northern Telecom 62,63

OnLine/Database Software 48
On-Line Software 56-57,96
Oracle 11

PARS Service Partnership. 14,15,16
Plus Development Corporation 106-107
Princeton Graphics 84

Rabbit Software 54-55
Radio Shack C3
Realia 77
Relational Technology Inc. 14-15,24

SAS Institute 12-13,95
Software Engineering of America .. 9
SPSS 52
SunRiver Corp. 72-73
Syncsort 3
Systems Integration Conference. 38

Unisys 26-27

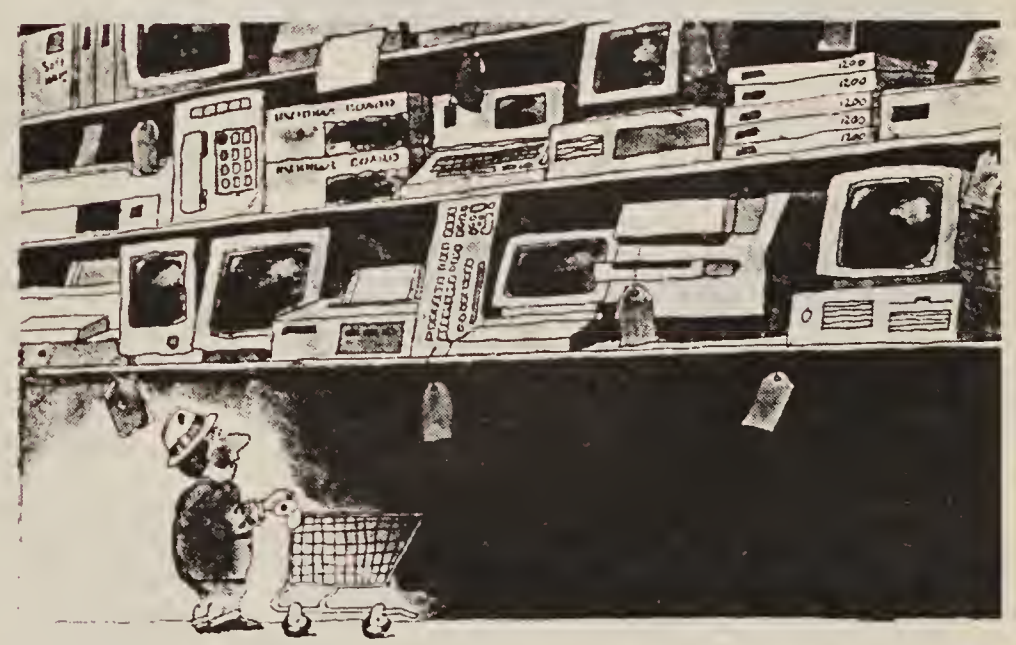
Video Seven 74
VM Software 7

Wang 34,101
Wyse Technology 32

Xerox 28/29

Zenith Data Systems 85

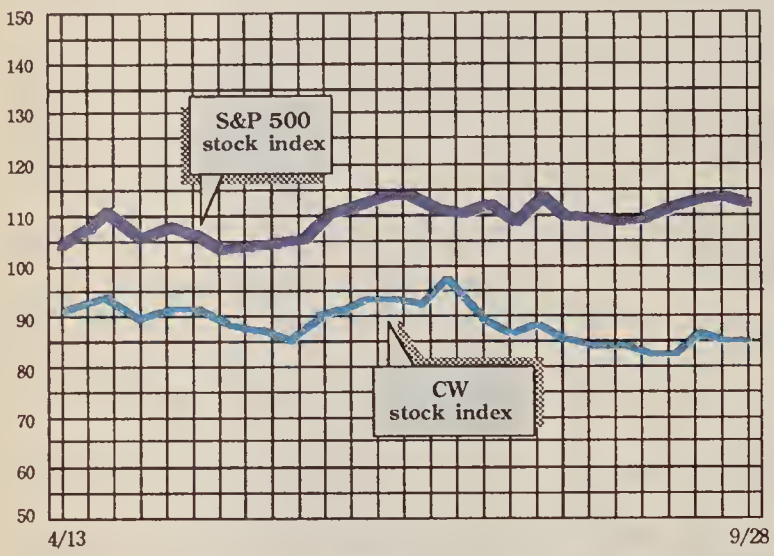
This index is provided as an additional service. The publisher does not assume any liability for errors or omissions.



Upcoming Computerworld Spotlight Sections

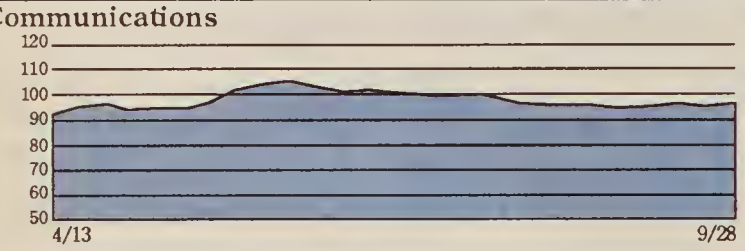
Issue Date	Topic	Ad Closing Date
Oct. 17	AI/Expert Systems	Sept. 30
Oct. 31	Unix	Oct. 14
Nov. 14	PC Graphics	Oct. 28
Dec. 5	LAN's	Nov. 18
Dec. 19	IBM-Compatible PCs/PS2 Market Products/Monitors	Dec. 2

STOCK TRADING INDEX

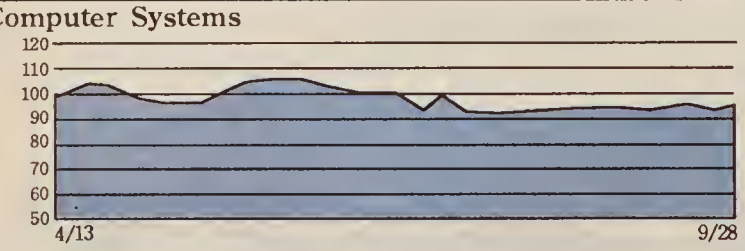


Indexes	Last Week	This Week
Communications	95.7	96.9
Computer Systems	94.7	95.9
Software & DP Services	102.9	100.6
Semiconductors	59.3	58.7
Peripherals & Subsystems	79.6	80.2
Leasing Companies	113.2	114.9
Composite Index	85.6	85.0
S&P 500 Index	113.8	112.9

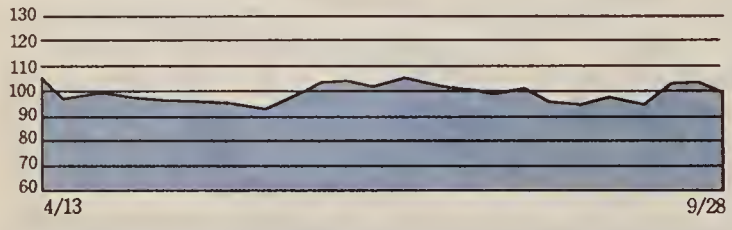
Communications



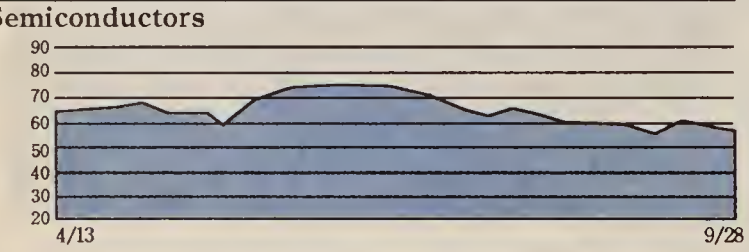
Computer Systems



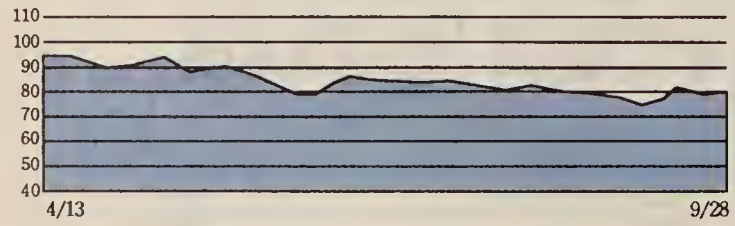
Software and DP Services



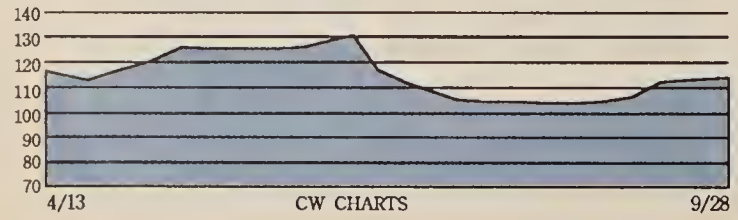
Semiconductors



Peripherals and Subsystems



Leasing Companies



CW CHARTS

Computerworld Stock Trading Summary

CLOSING PRICES WEDNESDAY, SEPT. 28, 1988

EXCH		52-WEEK RANGE (1)		CLOSE SEPT. 28 1988	WEEK NET CHNGE	WEEK PCT CHNGE
		PRICE				

Communications and Network Services

N	AMERICAN INFD TECHS CORP	100	74	92.75	-1.3	-1.3
Q	ANDREW CDRP	19	11	16.5	0.3	1.5
Q	ARTEL COMM CORP	3	1	2	-0.1	-3.1
N	AT&T	35	20	25.875	-0.6	-2.4
Q	AVANT GARDE CDMP INC	5	1	0.75	-0.3	-25.0
Q	AVANTEK INC	16	5	5.75	-0.1	-2.1
N	AYDIN CORP	35	16	23.25	1.0	4.5
N	BELL ATLANTIC CDRP	80	61	70.5	-0.9	-1.2
N	BELLSOUTH CORP	44	29	40.5	1.0	2.5
Q	CDMPRESSION LABS INC	6	2	3.125	0.0	0.0
D	COMPUTER NETWORK TECH	5	1	1.219	0.1	8.3
D	CONTEL CORP	38	25	37.875	2.5	7.1
Q	DATA SWITCH CDRP	10	4	6.625	-0.4	-5.4
Q	DIGITAL COMM ASSOC	46	20	21.625	0.8	3.6
Q	DYNATECH CDRP	29	14	20.75	-0.3	-1.2
Q	FIBRONICS INTL	5	2	3.125	-0.1	-3.8
Q	GANDALF TECHNOLDGIES	B	5	6.375	0.0	0.0
Q	GENERAL DATACOMM INDS	8	3	3.625	0.1	3.6
N	GTE CORP	44	29	42.875	0.9	2.1
Q	INFOTRON SYS CORP	14	5	11.375	0.1	1.1
N	ITT CORP	65	42	49.375	0.5	1.0
N	M A COM INC	15	7	10	0.0	0.0
Q	MCI CDMMUNICATIDNS CDRP	19	7	19.75	1.1	6.0
Q	MICDM SYS INC	17	7	15.625	0.1	0.8
Q	NETWORK EQUIPMENT TECH INC	28	12	15.5	-0.5	-3.1
Q	NETWORK SYS CDRP	13	7	9.375	0.4	4.2
N	NDRTHERN TELECOM LTO	23	14	17.875	0.5	2.9
Q	NDVELL INC	31	12	29.5	-0.3	-0.8
N	NYNEX CORP	78	58	65.375	-0.8	-1.1
N	PACIFIC TELESIS GROUP	34	23	30	0.0	0.0
N	PARADYNE CORP	8	4	5.25	-0.6	-10.6
A	PENRIL CORP	5	1	4.375	0.1	2.9
N	PLESSEY PLC	38	23	26.875	0.1	0.5
N	SCIENTIFIC ATLANTA INC	18	8	12.25	0.1	1.0
N	SDUTHWESTERN BELL CDRP	46	22	39.75	0.3	0.6
Q	3 CDM CDRP	26	12	17.625	1.9	11.9
N	U S WEST INC	60	43	57.5	1.5	2.7

Computer Systems

Q	ALLIANT COMPUTER SYS	16	4	4.5	-0.1	-2.7
Q	ALPHA MICROSYSTEMS	8	3	6.5	0.5	8.3
Q	ALTOS CDMPUTER SYS	15	7	8.125	0.0	0.0
A	AMDAHL CDRP	28	10	19.125	0.9	4.8
Q	APOLLO COMPUTER INC	23	9	9	-0.1	-1.4
Q	APPLE COMPUTER INC	60	28	43.5	0.8	1.8
N	8OLT BERANEK & NEWMAN	25	12	13.125	-2.8	-17.3
Q	BRITTON LEE INC	4	1	2.375	-0.1	-2.6
N	COMPAQ COMPUTER CORP	79	34	56.75	1.0	1.8
Q	COMPUTER AUTOMATION INC	16	4	5.375	0.0	0.0
A	COMPUTER CONSOLES INC	9	2	8.625	0.1	1.5
Q	CONCURRENT COMP CORP	21	11	19.813	0.2	1.0
N	CONTROL DATA CDRP	38	18	22.375	-0.1	-0.6
Q	CDNVERGENT TECH	7	3	6.438	0.1	2.0
Q	CDNVEX COMPUTER CORP	15	6	7.25	-0.1	-1.7
N	CRAY RESH INC	99	47	69.5	-3.5	-4.8
Q	OAISY SYS CDRP	12	5	8.375	-0.1	-1.5
N	OATA GEN CORP	37	16	18.75	-0.5	-2.6
N	DATAPOINT CORP	9	3	5.125	0.1	2.5
Q	DELL COMPUTER CORP	12	8	9.75	-0.5	-4.9
N	DIGITAL EQUIP CORP	200	92	95.375	2.8	3.0
N	FLDATING POINT SYS INC	10	3	2.5	-0.4	-13.0
N	GOULD INC	34	8	22.5	0.1	0.6
N	HARRIS CORP	40	22	26.75	0.9	3.4
N	HEWLETT PACKARD CD	74	36	49	0.0	0.0
N	HONEYWELL INC	82	49	63.125	3.6	6.1
N	I8M	157	102	113.875	0.6	0.6
Q	INFORMATION INTL INC	16	9	13.75	0.0	0.0
Q	IPL SYS INC	3	1	3.125	0.6	25.0
N	MAI 8ASIC FDUR INC	21	9	18.5	0.0	0.0
Q	MASS CDMPUTER CORP	14	4	4.5	0.0	0.0
N	MATSUSHITA ELEC INDL LTD	230	103	186	-6.0	-3.1
Q	MEGAOATA CORP	6	2	1.75	-0.3	-12.5
Q	MENTOR GRAPHICS CORP	39	14	28.5	-0.5	-1.7
N	N8I INC	12	3	2.5	-0.5	-16.7
N	NCR CORP	87	50	58.375	-0.1	-0.2
N	PRIME COMPUTER INC	26	12	14.25	0.5	3.6
Q	PYRAMID TECHNOLOGY	16	5	13.75	0.3	1.9
Q	SILICDN GRAPHICS CDRP	25	11	17.125	0.6	3.8
Q	STRATUS CDMPUTER	35	15	24.875	1.5	6.4
Q	SUN MICROSYSTEM INC	44	14	35.5	-1.0	-2.7
Q	SYM8OLICS INC	4	1	1	-0.1	-5.9
Q	SEQUENT COMPUTER SYS INC	19	9	15.625	-0.9	-5.3
N	TANDEM COMPUTERS INC	37	12	14.125	0.6	4.6
N	TANDY CDRP	57	28	39.625	-2.0	-4.8
N	ULTIMATE CORP	37	9	10.75	0.8	7.5
N	UNISYS CDRP	47	24	32	-0.5	-1.5
A	WANG LA8S INC	19	9	9.25	0.1	1.4

Software & DP Services

Q	ADVANCED CDMP TECH	6	1	1.75	0.1	7.7
N	AGS COMPUTERS INC	30	11	28.125	-0.1	-0.4
Q	AMERICAN MGMT SYS INC	20	9	13.625	-0.1	-0.9
Q	AMERICAN SOFTWARE INC	16	6	15.375	-0.5	-3.1
N	ANACOMP INC	12	4	9	-0.4	-4.0
Q	ANALYSTS INTL CORP	10	4	8.625	0.1	1.5
Q	ASHTON TATE	33	13	25	-1.8	-6.5
Q	ASK COMPUTER SYS INC	16	6	12.25	-0.4	-3.0
Q	AUTDDESK INC	34	12	28.125	-0.1	-0.4
N	AUTD DATA PRDCESSING	53	16	36.75	-0.4	-1.0
Q	8DOLE & 8A88AGE INC	11	5	9.75	0.0	0.0
N	8USINESSLAND INC	16	7	13	0.0	0.0
N	COMPUTER ASSOC INTL INC	37	15	28.5	0.9	3.2
Q	COMPUTER HORIZDNS CDRP	14	7	7.875	-1.9	-19.2
N	COMPUTER SCIENCES CORP	73	38	49	-2.3	-4.4
Q	CORPORATE SOFTWARE	15	5	11	1.3	12.8
N	COMPUTER TASK GROUP INC	16	9	13.25	-0.1	-0.9
Q	COGNOS INC.	14	4	6.375	-0.4	-5.6
Q	CDMSHARE INC	25	12	20.625	0.1	0.6
N	CULLINET SOFTWARE INC	14	4	6	0.0	0.0
Q	DUQUESNE SYS INC	22	10	16.25	-1.0	-5.8
N	GENERAL MTRS (CLS E)	51	30	42.25	-0.3	-0.6
Q	HOGAN SYS INC	10	3	5.5	0.6	12.8
Q	INFORMIX CORP	31	7	7.5	-0.4	-4.8
Q	INTELLICORP INC	6	2	3.5	-0.1	-3.4
Q	KEANE INC	16	6	13	-0.8	-5.5
Q	LOTUS OEV CORP	40	16	19.5	-0.3	-1.3
Q	MANAGEMENT SCI AMER	14	6	7.75	-0.8	-8.8
Q	MICRO PRO INTL CORP	7	2	2.875	-0.2	-6.1
Q	MICROSDFT CORP	79	37	53	-0.8	-1.4
Q	MORINO ASSOCIATES INC	20	7	14.75	0.3	1.7
Q	NATIONAL DATA CDRP	32	20	23.25	0.4	1.6
Q	ON LINE SOFTWARE INTL INC	19	4	4.375	-0.5	-10.3
Q	ORACLE SYS CORP	22	8	19	-1.0	-5.0
N	PANSOPHIC SYS INC	28	11	12.75	-0.8	-5.6
Q	PHOENIX TECHNOLOGIES INC	18	15	17.5	0.8	4.5
Q	POLICY MGMT SYS CORP	30	15	22	-1.0	-4.3
Q	PROGRAMMING & SYS INC	14	7	13	0.5	4.0
Q	RA8BIT SOFTWARE INC	4	2	3.125	-0.1	-3.8
Q	RELATIONAL TECH INC	21	13	13.125	-1.6	-11.0
Q	REYNOLDS & REYNOLOS CO	33	14	21.875	0.4	1.7
Q	SEI CORP	22	10	18.75	-0.3	-1.3
Q	SHAREO MEO SYS CORP	28	15	19.125	0.0	0.0
Q	SAGE SOFTWARE INC.	13	5	7.75	-0.1	-1.6
Q	SOFTWARE PUBG CORP	27	5	23.875	-0.5	-2.1
A	STERLING SOFTWARE INC	11	6	6.875	0.4	5.8
Q	SUNGARD DATA SYS INC	20	10	18.75	0.3	1.4
Q	SYSTEMATICS INC	34	19	28.5	-2.3	-7.3
N	SYS. SOFT INC.	24	7	21.875	-0.4	-1.7
Q	VM SDFTWARE INC	18	7	14.75	0.5	3.5

Semiconductors

N	ADV MICRO OEVICES INC	25	8	10.875	-0.1	-1.1
N	ANALOG DEVICES INC	20	8	11.125	-0.9	-7.3
Q	ANALOGIC CORP	11	5	7.125	0.1	1.8
Q	CHIPS & TECHNOLOGIES INC	30	B	11.75	-0.8	-6.0
Q	INTEL CORP	42	18	27.25	-1.3	-4.4
Q	LSI LOGIC CORP	15	7	10	-1.1	-10.1
Q	MICRON TECHNOLOGY INC	26	6	20	1.0	5.3
N	MOTDRDLA INC	74	35	42.375	-1.1	-2.6
N	NATL SEMICONOUCTOR	22	8	8.75	-0.1	-1.4
N	TEXAS INSTRS INC	80	36	41.25	0.8	1.9
A	WESTERN DIGITAL CORP	27	11	14.125	-0.5	-3.4

Peripherals

Q	ALLOY COMP.	10	2	2.5	-0.3	-9.1
N	AM INTL INC	8	3	5.5	-0.1	-2.2
Q	AST RESH INC	18	6	8.25	-0.8	-8.3
Q	AUTO TROL TECH CORP	6	3	4.875	-0.4	-7.1
Q	BANCTEC INC	14	5	8.125	-0.3	-3.0
Q	CIPHER DATA PRODS INC	11	4	9	-0.5	-5.3
A	COGNITRONICS CDRP	4	2	3	0.2	6.6
Q	CDNNER PERIPHERALS	10	7	7.75	-0.3	-3.1
A	OATAPROOUCTS CORP	24	7	10.625	0.1	1.2
A	OATARAM CORP	8	5	8.375	0.5	6.3
N	EASTMAN KODAK CO	71	39	44.75	-0.1	-0.3
Q	E M C CORP MASS	25	4	4.375	0.1	2.9
Q	EMULEX CORP	9	4	10.125	1.1	12.5
Q	EVANS & SUTHERLAND	28	14	15	0.0	0.0
Q	ICOT CORP	8	3	3.125	0.3	8.7
Q	INTERLEAF INC	24	10	9	-1.8	-16.3
Q	IOMEGA CORP	5	1	3.5	-0.2	-5.1
Q	LEE OATA CORP	6	3	2.875	-0.1	-4.2
Q	MASSTOR SYS CORP	4	1	2.313	-0.1	-2.6
Q	MAXTOR CORP	16	6	6.625	-0.4	-5.4
Q	MICROPOLIS CORP	34	10	8.5	-2.3	-20.9
Q	MINISCRIBE CORP	17	5	8.75	-0.1	-1.4
N	MINNESDTA MNG & MFG CO	84	45	64	-0.1	-0.2
A	MSI OATA CDRP	22	8	21.5	2.9	15.4
Q	PERSONAL COMPUTER PROOUCTS INC.	7	4	5.438	0.0	0.0
Q	PRIAM CORP	3	1	1.625	0.0	0.0
Q	PRINTRONIX INC	12	7	10	-0.6	-5.9
N	QMS INC	27	7	7.625	-0.3	-3.2
Q	QUANTUM CORP	18	8	12.75	0.8	6.3
N	RECOGNITION EQUIP INC	17	6	7.5	-0.5	-6.3
Q	REXON INC	9	4	7.375	0.4	5.4
Q	SEAGATE TECHNOLDGY	23	8	8.625	-0.8	-8.0
N	STORAGE TECH CORP	4	1	1.875	-0.1	-6.3
Q	TANDON CORP	4	1	1.688	-0.2	-10.0
A	TEC INC	6	3	3	0.0	0.0
N	TEKTRONIX INC	36	21	21.75	-0.1	-0.6
Q	TELEVIOEO SYS INC	3	1	0.688	0.0	0.0
N	XEROX CORP	81	50	56.625	1.9	3.4

Leasing Companies

Q	AMPLICON INC	17	7	14.5	0.5	3.6
N	CAPITAL ASSOC INTL	9	4	6.75	-0.1	-1.8
N	COMDISCO INC	37	12	20.625	-0.4	-1.8
Q	CONTINENTAL INFO SYS	11	4	4.25	0.4	9.7
Q	LOI CORPORATION	17	9	13.25	0.5	3.9
Q	SELECTERM INC	6	3	4.75	-0.1	-2.6

EXCH:N=NEW YORK;A=AMERICAN;Q=NATIDNAL

Livestock

Stock market begins to graze in the green again

Nobody's talking tidal waves or quantum leaps yet, but the stock market at large did show signs of renewed activity last week — prodded, according to analysts, by institutional investors' end-of-the-quarter portfolio adjustments. Prominent among the stocks benefiting from the small surge were IBM, which closed up 2½ points at 115⅜, and Digital Equipment Corp., climbing 3⅛ points to end the week at 96⅝.

The warm wind of optimism took the chill off of AST Research, Inc.'s report that its current-quarter results will come in below expectations; warning notwithstanding, the company's stock rose ⅛ of a point to 8½.

The favorable breezes, however, did not blow through Westboro, Mass. In what is becoming an annual event, Data General Corp. announced a round of cost-cutting, including a massive layoff; near the end of the week, its stock was down ⅛ of a point from 8½.

MSI Data Corp. — entertaining takeover offers from unsolicited suitor Telxon Corp. and white knight Symbol Technologies, Inc. — saw its stock soar 5¼ points from 17 to 23¼.

NELL MARGOLIS

Network standards or nothing

Users still see single-vendor interest in latest management strategies

BY KATHY CHIN LEONG
CW STAFF

Digital Equipment Corp.'s recent entry filled out the foursome of major systems vendors offering multivendor network management strategies. But users are taking a jaundiced view of DEC's Enterprise Management Architecture and the other strategies, seeing them as maneuvers to lock them into a proprietary environment.

The other playing pieces are in place, and vendors have drawn their lines — IBM with Netview, Hewlett-Packard Co. with its graphical Openview and AT&T with its Unified Management Network Architecture (UMNA) to support voice and data.

A variety of users expressed frustration, charging that the network management strategies espoused do not seem to sufficiently support hybrid networks. "It looks like the issue of standards is being mocked once again," one user said.

The major vendors have said their network management architectures will become compatible via the ISO's Open Systems Interconnect (OSI), but each company is approaching OSI development differently. While AT&T and HP are participants in the OSI forum to further network management standards, DEC and IBM have not joined.

Many skeptical users said they will stall their network management decisions until they see products that will easily interoperate among different hardware persuasions.

For captive IBM, DEC or AT&T shops, however, users agreed that some network management is better than none at all.

The advent of distinct network management systems further confuses the market, according to Ken Minnet, network systems manager at Chevron Corp., a Netview user.

No help to users

The vendors' global promises carry little weight with some users who believe the industry has yet to solve user problems of physical connectivity.

"It's been hard enough getting different vendors' products to communicate. We've had no time for multivendor network mangement so far," said George Billings, manager of Network Computing Services at Pitney Bowes, Inc.'s Corporate Engineering and Technology Division in Stamford, Conn.

Brave users are beginning to tackle the network management problem through a series of pilots. At Rush Presbyterian Hospital in Chicago, the new products from these vendors will be tested thoroughly, said Bill Wellman, Rush associate vice-president of administration. The hospital has installed prototype pilots of Netview. In a separate department, AT&T's UMNA software is under scrutiny.

While the vendors have said the network management products will interoperate with other systems, users are skeptical about the level of network management. Dave Langholff, network manager at Pacific Gas and Electric Co., said, "I don't want a product that will merely echo the presence of a node on-line. I want to be able to restore it and fix it remotely."

At the University of Southern California, network manager Jim Widel said he would like to obtain a centralized network reporting system but that "the network interfaces from these don't seem to do much."

Hence, users of hybrid networks are waiting until the OSI standard matures. Others will wait until they see a vendor address management of voice, T1 and Integrated Services Digital Networks.

Users are adamant in demanding one generic network management scheme to take care of these multivendor nets.

Chevron's Minnet said, "I would rather have a standard network management package that did basic management for all the vendors than to have a vendor-specific package that had all the bells and whistles."

Senior Editor Elisabeth Horwitt contributed to this report.

Wish list

FROM PAGE 1

ISDN to work with all types of CPE equipment. . . . The question before us is, How do you make it real?" said Richard W. Stephenson, a Southwestern Bell Corp. district manager who is chairman of the forum's ISDN Implementors' Workshop.

A strong point

Large users said that the ISDN user's forum will be helpful in convincing vendors of the need for standardization.

"What's happening here is analogous to what happened in the early stages of the MAP/TOP users group," said Jim Splear, a telecommunications manager in General Motors Corp.'s Electronic Data Systems Corp. (EDS) subsidiary.

"This is our chance to explain a series of business situations to a set of ISDN vendors. If the vendors realize just how big the business opportunity is, they'll also understand the need to standardize."

Among the user proposals for ISDN applications submitted for vendor review are the following:

- A proposal by EDS that would link thousands of high-resolution graphics terminals for the purpose of sharing computer-aided design and manufacturing drawings. EDS would like an ISDN interface that works equally well with workstations made by Sun Microsystems, Inc., Apollo Computer, Inc., Hewlett-Packard Co., Digital Equipment Corp. and IBM.

GM also proposed a Manufacturing Automation Protocol 3.0 interface to connect factory-floor networks with wide-area networks through ISDN technology.

- A proposal by American Express Co. — already being used in a pilot project — to use incoming phone calls as a trigger for the retrieval of customer account information.

The American Express proposal aims at saving time, reducing data traffic and providing higher levels of customer service. The three-month ISDN pilot, which uses a Megacom 800 switch to handle toll-free customer inquiry calls, began this summer.

- 3M Co. proposed a data-conferencing capability that would allow local-area network access to information databases and to print servers and file servers across long-distance ISDN links. The aim of the proposal is to ensure ISDN compatibility with standard PC LAN technology, including IBM's Netbios and Token-Ring protocols. If implemented, this project would open departmental resources to hundreds of remote users over 64K or 128K bit/sec. lines.

Obstacle or two

Even if vendors agree to meet these user requirements, several obstacles may slow user acceptance of ISDN, users said. Many large sites are concerned that ISDN suppliers will resist standardization for fear of losing a competitive edge on special features.

Another concern is that ISDN will not provide enough bandwidth for some applications, including full-motion video. ISDN currently supports data-compressed video over a 128K bit/sec. line, which updates the picture only when something moves. The resulting stilted motion makes some users feel ISDN video is better suited to "chalk-talks" than to videoconferencing.

Second-class postage paid at Framingham, Mass., and additional mailing offices.
Computerworld (ISSN 0010-4841) is published weekly, except: (6) issues in February, May, August and October, (5) issues in January, March, April, June, July, September and November and (4) issues in December with a single combined issue for the last week in December and the first week in January of 1989 by CW Publishing/Inc., 375 Cochituate Road, Box 9171, Framingham, Mass. 01701-9171.
Copyright 1988 by CW Publishing/Inc. All rights reserved.
Computerworld can be purchased on 35 mm microfilm through University Microfilm Int. Periodical Entry Dept., 300 Zeeb Road, Ann Arbor, Mich. 48106. *Computerworld* is indexed: may be purchased from the *Computerworld* Back Issue Department. Back Issues, if available, may be purchased at $2.00 per issue, plus postage. Call M. McIndoe, (800) 343-6474, Ext. 371.
Photocopy rights: permission to photocopy for internal or personal use or the internal or personal use of specific clients is granted by CW Publishing/Inc. for libraries and other users registered with the Copyright Clearance Center (CCC), provided that the base fee of $3.00 per copy of the article, plus $.50 per page is paid directly to Copyright Clearance Center, 27 Congress Street, Salem, MA 01970.
Reprints (minimum 100 copies) and permission to reprint may be purchased from Nancy M. Shannon, CW Publishing/Inc., 375 Cochituate Road, Box 9171, Framingham, Mass. 01701-9171. Subscriptions call toll free (800) 669-1002.
Requests for missing issues will be honored only if received within 60 days of issue date.
Subscription rates: $2.00 a copy: U.S. — $44 a year; Canada, Central & So. America — $110 a year; Europe — $165 a year; all other countries — $245 a year (airmail service). Four weeks notice is required for change of address. Allow six weeks for new subscription service to begin.

MPA ABC ABP

POSTMASTER: Send Form 3579 (Change of Address) to *Computerworld*, P.O. Box 2044, Marion, OH 43305.

TCA pushes for privacy on corporate networks

BY KATHY CHIN LEONG
CW STAFF

SAN DIEGO — As more and more confidential data winds its way across corporate networks, users are expressing alarm over how much of that information is safe from subsidiaries of the Bell operating companies and long-distance firms providing transmission services.

This fear has prompted the Tele-Communications Association (TCA) and large network users to appeal to the Federal Communications Commission to clarify exactly what network data is available to these vendors.

Users with large networks, such as banks and insurance companies, are concerned that published details even of where a circuit is routed can be misused. "We don't want someone like an AT&T to use our information and then turn around and compete against us," said Leland Fong, a network planner at Visa International in San Francisco. Users are demanding that the FCC establish a set of rules and regulations so the information is not abused.

At issue is the term "customer proprietary network information" (CPNI), which encompasses packet data, address and circuit information and traffic statistics on networks. Under the FCC's Computer Inquiry III rules, long-distance carriers and Bell operating companies — specifically, marketing personnel — can get access to their own customers' CPNI unless users request confidentiality. What his group wants, TCA President Jerry Appleby said, is for the FCC to clarify exactly what falls under the category of CPNI.

Fong added that users can be at the mercy of the Bell operating companies and long-distance vendors if there are no safeguards established. Customer information such as calling patterns can be used by the operating companies for their own competitive advantage, he said. "At this time, there are no controls over CPNI, and the users need to see some action on this," Fong said.

Spread the concern

At a meeting here during the TCA show, TCA officials and the association's government liaison committee met with AT&T to discuss the issue; the group will also voice its concerns to other vendors.

Appleby said the issue should not be of concern just to network managers but to the entire company. Earlier this month, several banks, including Chase Manhattan Bank and Security Pacific National Bank, and credit card companies met with the FCC to urge it to come up with a standard definition for CPNI, Appleby said.

While the customer information is generally confidential, it is available to the transmission carrier that is supplying the line. The data is also available to the marketing departments of that vendor unless a company asks for confidentiality. Fong said there is no regulation that prevents a company from passing the data along to its subsidiaries.

TRENDS

DP budgets

Nearly 18% of U.S. industries spend in excess of $5 million on their data processing budgets, with slightly less than half of those spending more than $10 million, according to a recent survey.

The findings of Focus Research Systems, Inc. in West Hartford, Conn., also indicated that, of IBM and plug-compatible sites across the country, those with IBM 3000 series computers have the largest MIS budgets. Of sites using the IBM 3000 series, almost half spend more than $5 million on DP annually. Those budgets include salaries for internal staff, outside consultants, educational training, hardware and software.

Forty-five percent of the sites with National Advanced Systems computers spend between $1.1 million and $5 million, while more than half of the sites with Amdahl Corp. computers spend more than $5 million on their MIS budgets.

Sites with IBM 360 and 370 computers were found to spend the least; 93% had budgets of as much as $1 million, and more than half of those spend less than $500,000, according to the interviews.

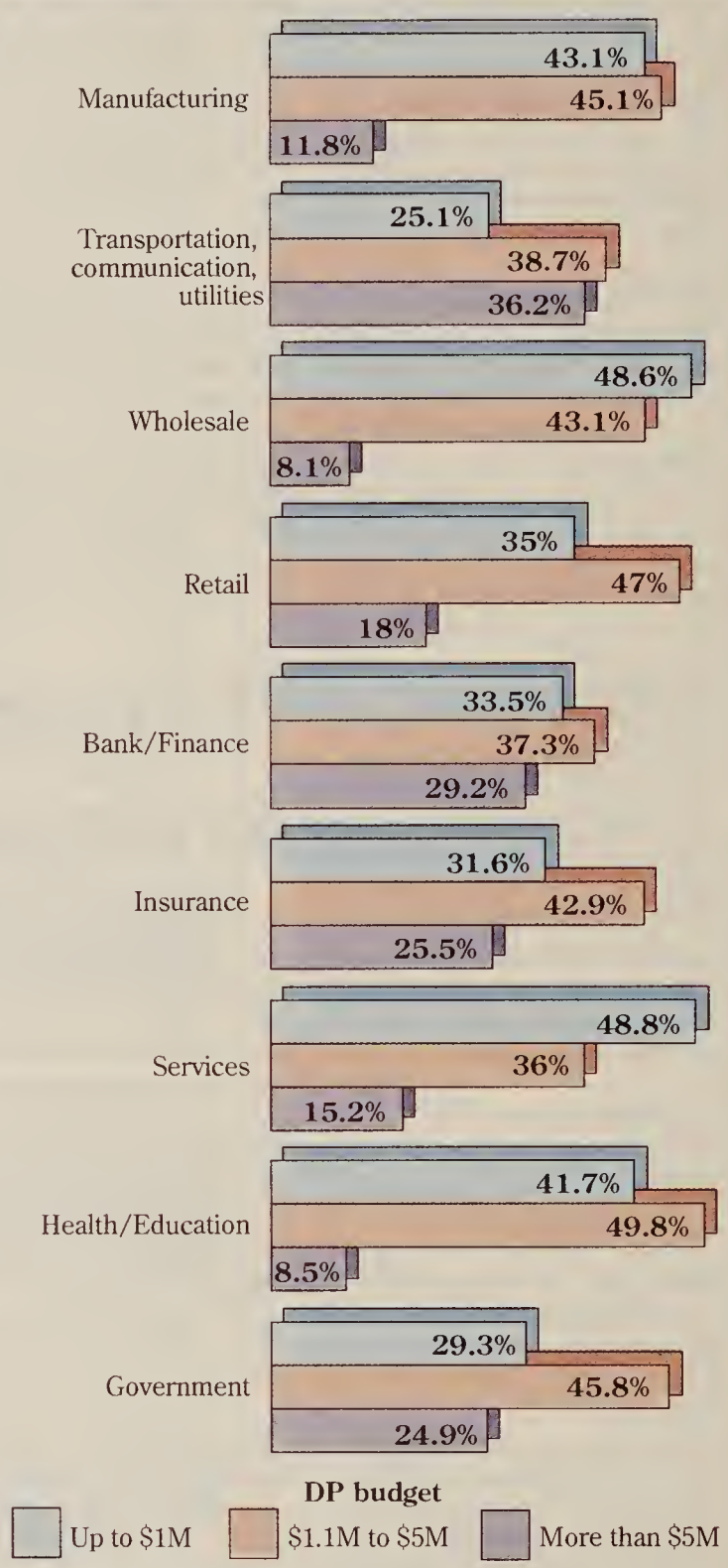
The majority of the big spenders fall into the categories of transportation, communications and utilities industries, with more than 35% of the companies involved in those industries spending in excess of $5 million on information technology and another 39% spending between $1 million and $5 million.

According to the survey, wholesale and services industries spend the least on DP, with close to half of the companies reviewed claiming to spend less than $1 million on their information technology budgets. Almost 20% of the companies involved in services said their budgets for technology are below the $500,000 level.

Falling into the category in which the majority of firms typically spend $1 million to $5 million on DP were retail, banking and finance, insurance, health and education, manufacturing and government.

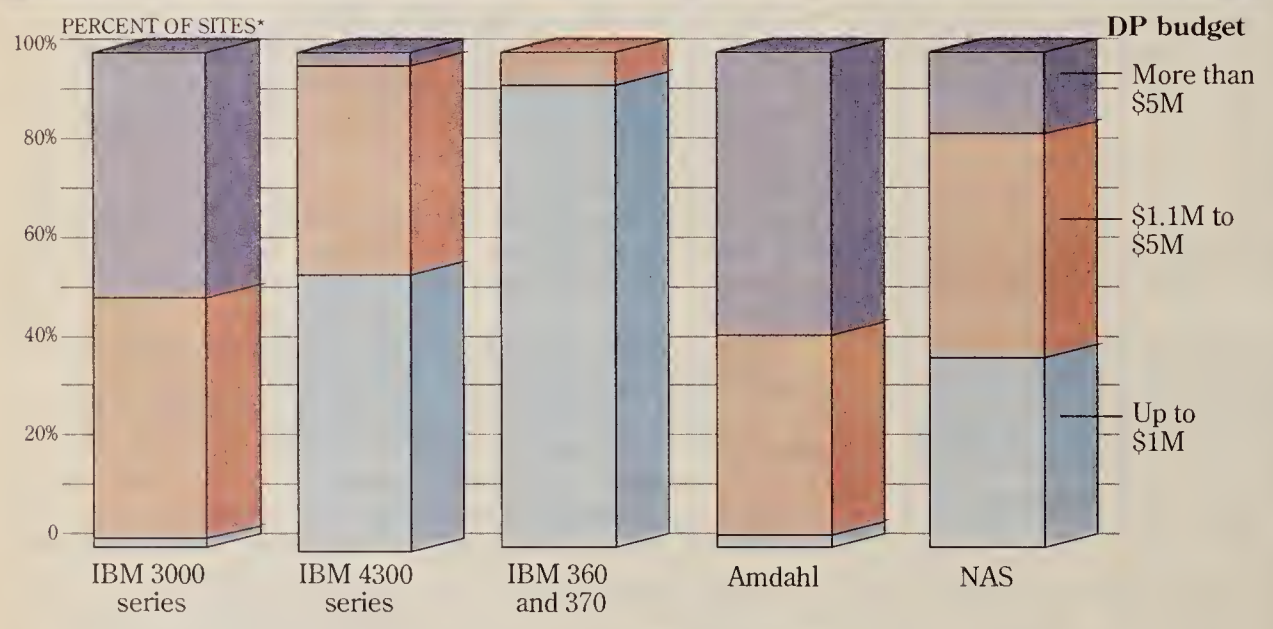
ALAN J. RYAN

Expenditures vary by industry



* Base of 11,000 respondents

IBM 3000 series users put out biggest bucks



* Base of 11,000 respondents

SOURCE: FOCUS RESEARCH SYSTEMS, INC.
CW CHARTS

INSIDE LINES

Ready to dump it in your lap. Look for Compaq to unveil its long-awaited laptop version of its Deskpro 286 at an Oct. 17 press conference, according to sources. Industry watchers were looking for the laptop at a press conference held two weeks ago, which resulted in a number of erroneous press reports. At the Sept. 19 gathering, Compaq Chairman Rod Canion said, the laptop "will be announced as planned on the date we planned to announce it." Compaq officials have declined to make any more specific comments on the machine.

A vote against "aberrations." Who said the computer industry has liberal leanings? Certainly not Storage Technology President Ryal Poppa, who recently wrote to the Colorado United Way urging the charity not to fund gay organizations. His letter discouraged support of "the quest for public recognition . . . of such social aberrations." Storage Tek is one of the local charity's largest contributors.

Get it all out in the Open. Sun Microsystems will likely follow suit if AT&T decides to join the Open Software Foundation. AT&T and the OSF are in negotiations over the future of the Unix operating system. "Sun is in a supporting role in the development of Unix," a Sun spokesman said. "Once negotiations between AT&T and OSF are concluded, Sun will make its decision." In fact, William Joy, Sun's R&D chief, was present at the OSF meeting last week (see story page 8) as an invited guest and, according to the OSF, a "prospective member."

Brave new world. NEC Home Electronics is prepping a four-pound laptop that uses a whole new approach to storing data and programs. Unlike most Microsoft MS-DOS compatible lappers that use floppies and hard disks, this one comes standard with about 1M byte of nonvolatile random-access memory. That way, the machine can be both lighter and sturdier. The machine also comes with a flip-up 640- by 480-pixel LCD display.

Blue troops get religion. The word from the trenches is that IBM sales representatives are unusually enthusiastic about the Application System/400 mid-range systems. Users more accustomed to the pinstripers selling System/36s like they were just so many coldcuts are being inundated by fervent marketeers eagerly pointing to new features, as in: "Hey, come here. Let me show you what I learned to do on this thing." The irony is that most of those neat features have been around for almost a decade at the heart of the System/38 — the computer with the loyal customer base and the lukewarm backing of IBM.

Here's the Word on Windows. Folks have long wondered why it has taken Microsoft so long to kick out Windows applications when they have been tirelessly telling all other software vendors that Windows is the way to go. One of the reasons, at least in word processing, is that Microsoft is doing just fine without good old Windows. The firm has been doing exceptionally well developing a Windows-based word processor, but the character-based Word is selling so fast that the firm has held the project back. But Windows aficionados should fear not, because the product looks to be heading to beta in a month or so and should ship early next year.

We can't work on 1-2-3? Gee! In the rush to get 1-2-3 Release 3.0 done, Lotus has apparently pulled some programmers off the graphical 1-2-3/G project. But the Presentation Manager-based /G program will still get finished by next summer or fall, a Lotus source confidently maintained.

Putting his life on the line, an AT&T spokesman would stop at nothing last week to deny a published report that the company was bailing out on Sun's RISC processor. He offered up his home address so our reporters could bomb it if his denial was later retracted, which is an opportunity we've often wished for in dealing with official spokesmen. If you're unhappy with official statements, call the hot line at 800-343-6474 or 508-879-0700 and let News Editor Pete Bartolik put his news hounds on the scent of the real story.

Tandy® Computers: The broadest line of PCs in America.

The New Tandy 5000 MC

Our most powerful 386™ based computer ...made in America.

The new Tandy 5000 MC Professional System is pure performance, from the look of its 256,000-color VGA graphics to the tactile feel of its newly designed keyboard.

Inside is pure performance, from the Intel® 80386 processor operating at 20 MHz to the high-speed memory with cache controller that provides RAM-fast access to your data.

With the 5000 MC, you have the high-performance platform needed to take full advantage of industry-standard MS-DOS® applications, powerful new MS® OS/2 programs or multiuser SCO™ XENIX® software.

Operating at 20 MHz, the 5000 MC cuts through the big jobs like database management, large spreadsheets and sophisticated graphics. And its IBM® Micro Channel™ compatible architecture allows multiple processors to use the same bus. The system architecture also provides a radical increase in data-transfer rates when configured within a 3Com® workgroup or a XENIX multiuser environment.

The Tandy 5000 MC is the new alternative in personal computing. From the best-selling family of PCs in America.

Send me a 1989 RSC-20 computer catalog.

Mail to: Radio Shack, Dept. 89-A-754
300 One Tandy Center, Fort Worth, TX 76102

Name _____

Company _____

Address _____

City _____ State _____

ZIP _____ Phone _____

Tandy Computers: Because there is no better value.™

Intel/Reg. TM Intel Corp. IBM/Reg. TM and Micro Channel/TM IBM Corp. MS, MS-DOS and XENIX/Reg. TM Microsoft Corp. SCO/TM The Santa Cruz Operation. 3Com/Reg. TM 3Com Corp.

Radio Shack®
COMPUTER CENTERS
A DIVISION OF TANDY CORPORATION

OUR SOFTWARE HELPS THEM MERGE QUALITY WITH PROFITABILITY.

In little more than two years, First Union Corporation, headquartered in Charlotte, North Carolina, has established itself as one of the country's strongest and most profitable super-regional financial institutions. Through merger and acquisition, the company has built a five-state banking network with more than 700 offices.

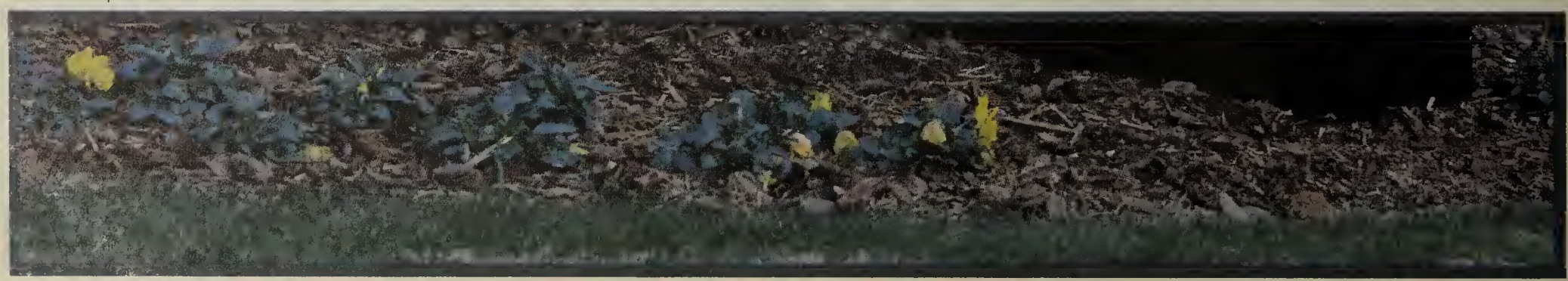
As part of its growth objectives, First Union continues to seek mergers with quality banks, while still retaining its high level of profitability. To help gauge profitability, the bank analyzes information generated by financial software from Management Science America, Inc.

"MSA's financial software systems permit us to centralize financial and human resource information quickly and accurately from all of First Union's banks. This allows us to make the comparative financial analyses necessary to evaluate our growth and manage our profitability," comments James H. Hatch, Senior Vice President and Controller.

"MSA's financial software is flexible enough to handle each new acquisition's accounting and reporting needs, so we can expand without having to change software," adds First Union's Patrick J. Mulcrone, Vice President—Financial Systems.

Find out how MSA software can help merge your bank's information. For information contact MSA's Robert Carpenter at (404) 239-2000.

MSA The Software Company



© 1987 Management Science America, Inc.